CIVIL ENGINEERING

MAR 9 1944

Published by the
American Society of Civil Engineers

Constructing Basement Under Part of Main Assembly Building, Marietta Aircraft Plant (See Articles, Page 93)

Volume 14 ~ Number 3 ~

MARCH 1944

FOR THE CARGO TO B
LOADED TOMORRO

In order to establish a world-wide balanc
of economic security and stabilizatio
America must help prepare the way fo
foreign governments to open their doo
to a universal interchange of produc
and ideas.

Today is the time for us to look beyon
the horizon and lay solid plans for buil
ing ports, piers, docks, jetties, harbor im
provements and other post-war develop
ments. These are the constructions whic
will need firm foundations for sponsorin
new industries... new communities..
new friendships in the world of tomorro

The ability of the Raymond organiz
tion to fulfill completely the obligation
assumes is a recognized fact the worl
over. For 47 years owners, architects an
engineers who want difficult work don
exactly right have formed the habit
seeking Raymond again and again. Writ
wire, cable or phone for a competen
Raymond engineer to discuss your pro
ject with you.

RAYMOND
CONCRETE PILE COMPAN

Branch Offices in Principal Cities

140 CEDAR STREET • NEW YORK 6, N.

SCOPE OF RAYMOND'S ACTIVITIES includes every recogni
type of pile foundation – concrete, composite, precast, steel, p
and wood. Also caissons, construction involving shore protecti
ship building facilities, harbor and river improvements a
borings for soil investigation.

Among Our Writers

R. W. Stuck (Case School of Applied Science, B.S. '15, C.E. '19) has had wide and varied experience in industrial plant construction and installation, including that as chief engineer on a 200-million-dollar metallurgical plant in Russia. Since 1934 he had been with the Corps of Engineers and is now in charge of Engineering and Operations for the South Atlantic Division Office.

A. G. Stanford (Clemson College, B.S. in C.E. '14) has been for the past 24 years with Robert and Company, Inc., architects and engineers of Atlanta, Ga., as manager of the electrical engineering department, of engineering promotional work, and as project manager. He is president of the Georgia Society of Professional Engineers.

L. E. Brigham (Colo. State College, C. and I.E. '13) has had many years of direct dealing with labor in both heavy and building construction. Under the Quartermaster General in the summer of 1940, he organized the Labor Relations Section and developed basic labor policies for War Department work.

Clarke Gardner (Baltimore Polytech. Inst. '22) specializes in city planning, water supply, and sewerage, and is consultant to several smaller cities in Maryland and Delaware. He is in responsible charge of public works operations at Salisbury, Md., as City Engineer and Superintendent of the Water Department. He is a member of the Planning Commission and Director of Civilian Defense for Wicomico County.

Charles A. Howard (M.I.T., '06) was Asst. to the Chief Engr., Consolidated Edison Co. of N.Y.; then an officer of several engineering and transporation firms. Before taking his present position as Technical Director of the Inter-American Development Commission, he was for several years with Ford, Bacon, & Davis, Inc. He has done financial, engineering, and development work in Europe, Asia, and Latin America.

Cyril P. Hubert received his early shipbuilding training in Australia. He became associated with the Los Angeles Shipbuilding and Drydock Company in 1917, and served as chief estimator during World War I. He joined the staff of the California Shipbuilding Corporation at its inception in 1941 as Chief Loftsman in charge of mold loft operations.

L. G. Sumner (Sheffield Scientific School of Yale U., '15) after brief experience in railroad work, entered the Connecticut Highway Department in 1916. He has served successively as designer, chief draftsman, and engineer of bridges, in which latter capacity he is in charge of all bridge design and maintenance for the Connecticut State Highway Department.

AMERICAN
SOCIETY OF
CIVIL
ENGINEERS
FOUNDED
1852

VOLUME 14 NUMBER 3

March 1944

COPYRIGHT, 1944, BY THE
AMERICAN SOCIETY OF CIVIL ENGINEERS
Printed in U. S. A.

Entered as second-class matter September 23, 1930, at the Post Office at Easton, Pa., under the Act of August 24, 1912, and accepted for mailing at special rate of postage provided for in Section 1102, Act of October 3, 1917, authorized on July 5, 1918.

CIVIL ENGINEERING

Published Monthly by the
AMERICAN SOCIETY OF CIVIL ENGINEERS
(Founded November 5, 1852)

PUBLICATION OFFICE: 20TH AND NORTHAMPTON STREETS, EASTON, PA.
EDITORIAL AND ADVERTISING DEPARTMENTS:
33 WEST 39TH STREET, NEW YORK

This Issue Contains

HUGE AIRCRAFT ASSEMBLY PLANT BUILT AT MARIETTA, GA.
Location and Planning 93
R. W. Stuck

Highlights of Construction Management 97
A. G. Stanford

MANPOWER IN CONSTRUCTION. IV. Structure of Organized Labor and Labor Laws 101
L. E. Brigham

A SMALL CITY MAKES POSTWAR PLANS 103
Clarke Gardner

LARGE-SCALE POWER PROJECTS PLANNED IN SOUTH AMERICAN REPUBLICS 105
Charles A. Howard

CUTTING PLATES FOR WELDED SHIP CONSTRUCTION 109
Cyril P. Hubert

HIGH-LEVEL HIGHWAY BRIDGE SPANS THAMES RIVER, CONN. I. History and Preliminary Investigations 111
L. G. Sumner

ENGINEERS' NOTEBOOK
Secondary Stresses in Bridge Members Due to Their Own Weight 114
W. E. Hanson

Nomographic Chart for Flow in Pipes Partly Full 115
H. M. Gifft

OUR READERS SAY 116
SOCIETY AFFAIRS 120
ITEMS OF INTEREST 132
NEWS OF ENGINEERS 134
DECEASED 135
CHANGES IN MEMBERSHIP GRADES 14
APPLICATIONS FOR ADMISSION AND TRANSFER 20
ENGINEERING SOCIETIES' PERSONNEL SERVICE 28
RECENT BOOKS 28
CURRENT PERIODICAL LITERATURE 30, 32, 34
EQUIPMENT, MATERIALS AND METHODS 36, 38, 40, 44, 47
INDEX TO ADVERTISERS 50

The Society is not responsible for any statements made or opinions expressed in its publications.

Reprints from this publication may be made on condition that full credit be given CIVIL ENGINEERING *and the author, and that date of publication be stated.*

SUBSCRIPTION RATES

Price 50 cents a copy; $5.00 a year in advance; $4.00 a year to members and to libraries; and $2.50 a year to members of Student Chapters. Canadian postage 75 cents and foreign postage $1.50 additional.

Member Audit Bureau of Circulations

Little things point the way to

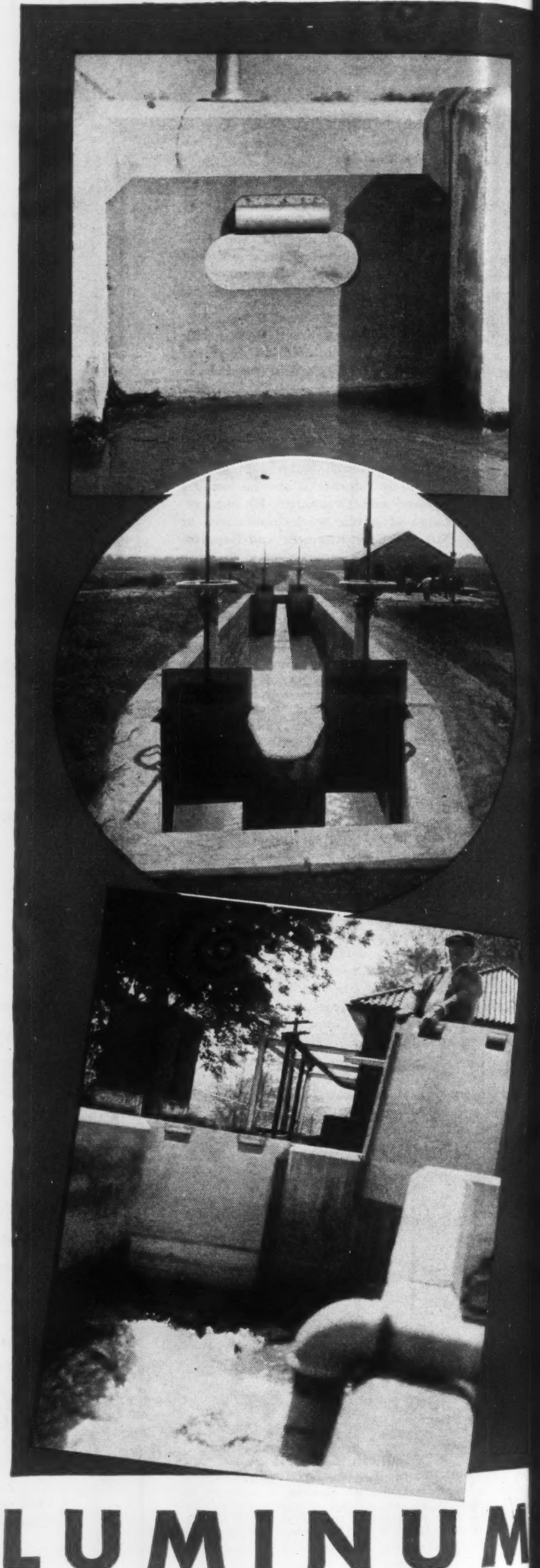
Big Savings

All through the war, and for years before the war, aluminum stop gates like these have been serving in sewage treatment plants all over the country. Nothing startling about that, except that the following facts about their performance point the way for designers of new plants: **1.** The lighter weight of aluminum gates has made work easier for operating men . . . **2.** There has been no rusting to destroy their usefulness or to cause gates to "freeze" in their guides . . . **3.** These Alcoa Aluminum gates are going right on working, good for many years of service.

Think of the many places in the jobs you now have on the drawing board where aluminum will serve you equally well. From skylights to sills, you can make construction better looking, longer lived, easier and cheaper to maintain, by specifying Alcoa Aluminum. In processing and handling equipment, ventilating ducts, conduit, instrument cases, and so on, you gain these same advantages.

Proof that it pays to build with aluminum is provided by its excellent performance in many treatment plants. Alcoa can give you data based on this experience to guide your design work. Write ALUMINUM COMPANY OF AMERICA, 2127 Gulf Building, Pittsburgh, Pa.

ALCOA ALUMINUM



Malcolm Pirnie
President

George T. Seabury
Secretary

Sydney Wilmot
Editor in Chief and
Manager of Publications

Don P. Reynolds
Assistant Editor

CIVIL
ENGINEERING

Committee on Publications
Scott B. Lilly
Chairman
N. W. Dougherty
S. C. Hollister
Fred C. Scobey
Wilbur M. Wilson
W. L. Glenzing
Advertising Manager

Volume 14
March 1944
Number 3

Huge Aircraft Assembly Plant Built at Marietta, Ga.

MAGNITUDE and speed of erection are the characteristics most common to the many war plants that have come into existence in the past two years. An outstanding example of such emergency construction is the assembly plant of the Bell Aircraft Company at Marietta, Ga. In addition to the problem of locating and erecting the steel-frame structure, engineers were faced with the need of providing a complete industrial sewerage system, a water supply system, and a paved airport. The two papers in this symposium, by Messrs. R. W. Struck and A. G. Stanford, were presented at the War and Postwar Engineering Conference of the Georgia Section, in which the Society as a whole participated.

Location and Planning

By R. W. Stuck, M. Am. Soc. C.E.
Chief Engineer, South Atlantic Division, War Department, Atlanta, Ga.

IN just twelve months the site of the Marietta plant was converted from wooded areas and cornfields to the enormous plant of the Bell Aircraft Corporation. The Engineering Site Board inspected the location on February 4, 1942. Based on its report, construction of the plant was authorized by the Chief of Engineers on February 16, and the work assigned to the District Engineer at Atlanta, under direction of the Division Engineer, South Atlantic Division. Eight days later, on February 24, a contract for Architect-Engineer-Manager Services was awarded to Robert and Company Associates. Work on designs started the next day, and 5 weeks later, on March 30, the first contract covering grading and excavation was awarded. Actual grading operations started the same day.

Thereafter work proceeded at a continually increasing pace, with from 5 to 16 new contracts awarded each month until the peak of construction was reached in January 1943. At that time about 6,300 persons were employed on the construction and over $6,300,000 worth of work was placed during the month. The excavation required to reduce the site to yard level consisted of about 436,000 cu yd of rock and 2,943,000 cu yd of earth.

The plant, constructed for the assembly of heavy bomber planes, will be operated by the Bell Aircraft Corporation. It consists of 11 permanent buildings, exclusive of gate houses, sewage treatment plant, and parking aprons for planes. An airfield adequate for flight testing of heavy planes is adjacent to the site.

The structure which dominates the site is the Main Assembly Building. Employees gain access to this through five headhouses spaced at approximately equal intervals along the north side of the building. Ramps from each headhouse lead to tunnels 28 ft wide which extend the full width of the building. The basement, under the center section of the building, contains toilet facilities, locker space, and lunch rooms for employees, storage space, and housing for mechanical equipment. Access to the main floor is by five stairwells adjacent to each of the five main tunnels.

The first floor is divided longitudinally into five main areas according to function. Each area is framed so as to accommodate certain operations. Along the north side is the railroad unloading section, 120 ft in width, where the trusses have a clear span of 120 ft. This section is separated by a wall from the remainder of the building. In this section two standard-gage railroad spurs extend the entire length of the building. Second is the manufacturing section, also 120 ft wide, framed like the railroad unloading section. Third is the mezzanine section, the same width, where the roof framing is the same as in the railroad unloading section, but the entire area is covered by a second and a third floor, supported by columns 20 by 25 ft on centers. The fourth section, 360 ft wide, is the subassembly section. Here, 120-ft truss spans are also used. The fifth section, which is the main assembly section, requires a clear span of 300 ft. For this span, flat Pratt trusses with subdivided panels were adopted. Throughout the building, the clear height from first floor to bottom of trusses is 45 ft. Throughout the length, trusses are 25 ft on centers and columns are 50 ft apart.

CEMENT ASBESTOS SIDING USED

Side-wall construction consists of brick walls 12 in. thick to a height of 10 ft above the floor. Above that point are panels composed of metal lath, fiber glass insulation $2^1/_2$ in. thick, and a vapor seal covered with corrugated cement asbestos sheets. The panels are supported by steel studs, in turn supported by girts attached to the columns. Expansion joints are provided in the side walls and roof 400 ft apart in a longitudinal direction, and from 300 to 360 ft apart laterally.

For the roof, 3-in. splined timber decking is supported by purlins 10 ft on centers. The decking is covered by a

SHEET-METAL LAYOUT SECTION OF MAIN ASSEMBLY BUILDING, MARIETTA AIRCRAFT PLANT

2-in. layer of fiber glass and a four-ply built-up roof. This roof, with an area of 47.3 acres, presents quite a drainage problem during a heavy rain storm. A total of 322 interior 5-in. downspouts will carry off water to storm sewers. This being a blackout plant, there are no windows. Fluorescent lighting is generally used, except in the basement.

An interesting feature of this building is the temperature-control system, which consists of two principal sections. A temperature-control system of some type was obviously necessary since the building is without windows or skylights and is 1,000 ft in width, so that adequate ventilation is impossible by natural draft. It was first intended to obtain equitable working and manufacturing conditions by means of forced ventilation only. However, when the number and size of the fans and duct work were determined, it was found that the quantity was so great that they could not be delivered in time. The War Production Board also objected to the huge quantity of materials involved. Permission was finally obtained from the WPB to install sufficient refrigeration to obtain the necessary conditions. As the smaller commercial units were more readily available, and also would conserve floor space, such units were installed in the trusses, without redesigning these members.

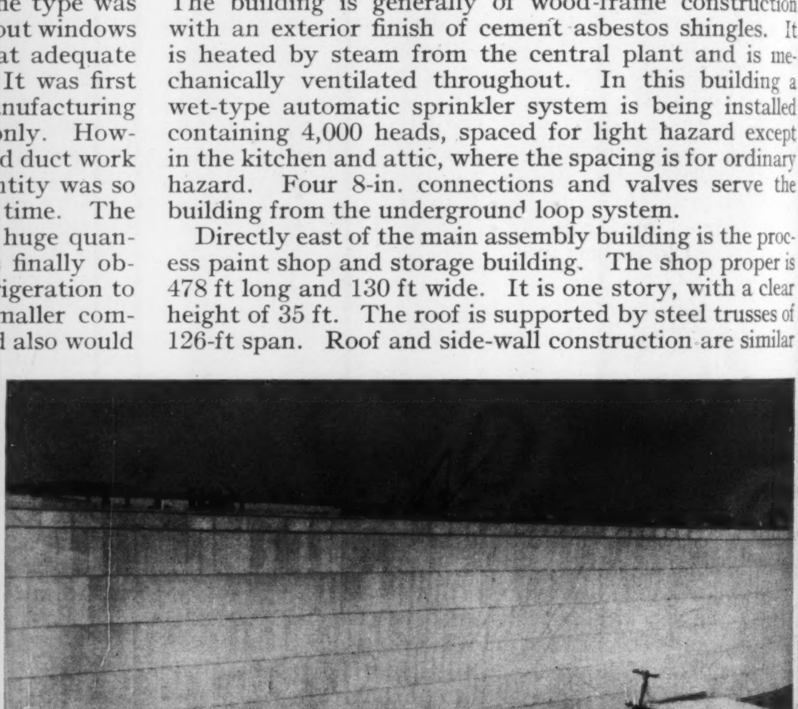
FIRE PROTECTION

Fire protection for the main assembly building is obtained in part by a wet-type sprinkler system containing 30,000 heads. All areas on the main floor and mezzanines are protected, as well as certain hazardous areas in the basement. There is one head for each 104 sq ft in the 300-ft-span main assembly area, and one for each 100 sq ft in all other areas. The system is supplied with water through two connections from the 12-in. underground loop and one connection from the 16-in. underground main. These connections feed 10-in. and 12-in. mains within the basement corridors. From these basement mains, eighty 8-in. risers and valves supply the overhead systems, for which 4,000 gal per min of water are available, or enough to supply 16 fire hose $2\frac{1}{2}$ in. in diameter. Although normal pressure is adequate, it can be increased by the addition of a standby fire pump of 2,000-gal per min capacity.

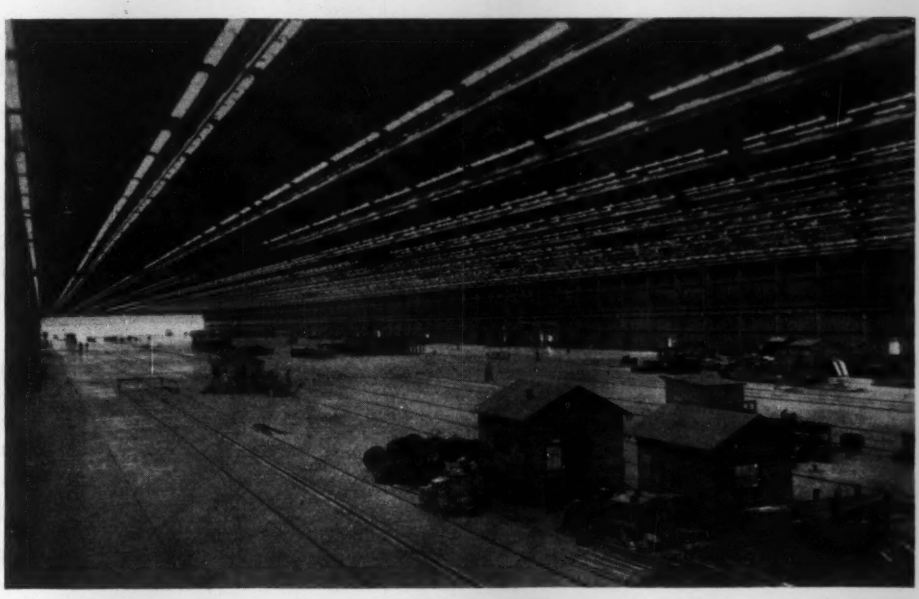
A special sewerage system for industrial waste is necessary in this building because of the large amounts of chromic, hydrochloric, sulfuric, hydrofluoric, and hot nitric acids, and of sodium cyanide, used in process work. These acids are treated in iron contact beds, and with lime obtained as a by-product in the generation of acetylene gas. Sodium cyanide must be ponded to lose concentration. All this waste must be handled in a special separate drainage and disposal system.

The office building, lying south of and parallel to the main assembly building, is designed to accommodate 2,500 workers. Its basement is connected to the main assembly building by a tunnel, which is an extension of one of the main assembly building tunnels. The basement contains the kitchen for the office cafeteria and for all lunch rooms in the main assembly building, toilet facilities, and utility installations. Above the basement, the office building, part of which is two-story, has a gross area of 199,000 sq ft. On the first floor, in addition to office space, there is a cafeteria seating 832 persons. The building is generally of wood-frame construction with an exterior finish of cement asbestos shingles. It is heated by steam from the central plant and is mechanically ventilated throughout. In this building a wet-type automatic sprinkler system is being installed containing 4,000 heads, spaced for light hazard except in the kitchen and attic, where the spacing is for ordinary hazard. Four 8-in. connections and valves serve the building from the underground loop system.

Directly east of the main assembly building is the process paint shop and storage building. The shop proper is 478 ft long and 130 ft wide. It is one story, with a clear height of 35 ft. The roof is supported by steel trusses of 126-ft span. Roof and side-wall construction are similar



EXTERIOR OF MAIN ASSEMBLY BUILDING IS SHEATHED WITH ASBESTOS CEMENT—NO WINDOWS OR SKYLIGHTS



Final Assembly Bay Has a Clear Span of 300 Ft
Note Single Door Closing End of This Area

to those of the main assembly building. Two canvas curtains are provided, suspended from the roof trusses to separate the cleaning section, spray section, and drying section.

Floors throughout this shop are spark proof. The paint storage room is 77 by 134 ft, has brick walls and a concrete roof supported by columns 19 ft by 18 ft 10 in. on centers. The sprinkler protection consists of a combination of deluge, dry, and wet systems according to the location. There are 1,500 outlets or heads supplied by three 10-in. connections to the 16-in. underground main, and two 8-in. connections to the 8-in. underground loop main; 4,500 gal per min of water is available to this system.

East of the process paint shop and storage building is the final assembly and cleanup building. Here the assembled planes, after leaving the main assembly building, are brought for finishing touches. Its overall dimensions are 859 by 204 ft, and it consists essentially of four hangars side by side. Each hangar unit has a door front and rear, with a clear opening of 190 ft by 45 ft. The hangars are framed of steel columns and trusses with a 200-ft clear span. Roof and side walls are similar to those of the main assembly building.

At the north end is a three-story lean-to, and at the south end a six-story lean-to. These are of concrete and masonry construction. These lean-tos contain offices, and space for pilots, normally found in a hangar, and in addition a 5-stall fire station with dormitory and fire-crew facilities. The sprinkler system covers only the hangar sections of the building and is of the deluge type, operated by heat-actuated devices. There are 2,000 outlets, supplied with water through four 12-in. connections to the 16-in. underground loop, with two 8-in. risers on each connection, or 250 outlets to each riser. For this system, 6,600 gal per min of water is available.

Northwest of the main assembly building is the hospital and employment building, a one-story frame structure with cement asbestos shingles for exterior finish. This building houses the personnel office and has space for interviewing applicants for employment, giving physical examinations, and processing applications. In the hospital wing are doctors' and nurses' offices, an X-ray laboratory, and emergency hospitalization rooms.

Opposite the northeast corner of the main assembly building is the dead-storage building, 226 by 310 ft, framed of timber. In cross section, the framing consists of five 45-ft timber trusses with a clear height above the floor of 25 ft. Side walls are of conventional wood girts and studs supporting wood sheathing, finished with cement asbestos shingles. The roof is of 2-in. wood decking supported by purlins at 7-ft 6-in. centers covered with 3-ply built-up roofing. Sprinkler protection is given by a standard dry-type system of 1,000 heads, supplied through two 10-in. connections to the underground 12-in. main. Air pressure at 40 lb per sq in. is maintained on the system, and the dry pipe valves are equipped with quick-opening devices.

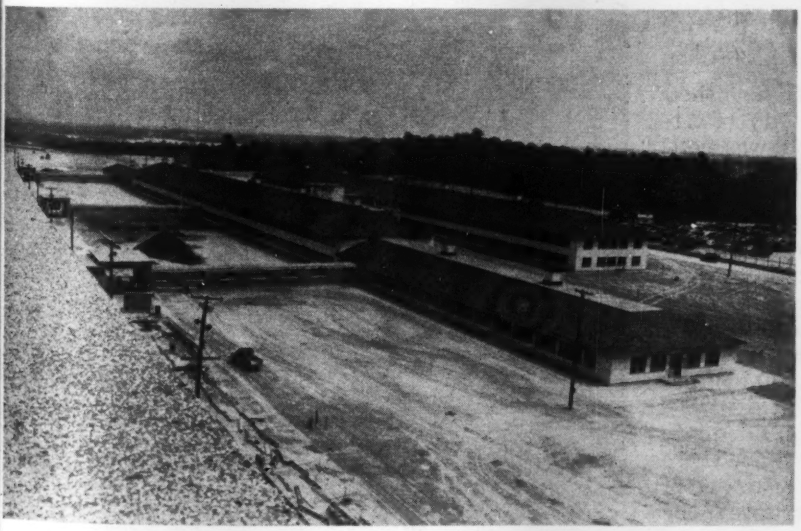
The steam plant is housed in a building 109 by 137 ft, of reinforced concrete up to the operating floor and structural steel frame above. The covering is corrugated cement-asbestos on the walls and reinforced-concrete slab on the roof, 58 ft above the lower floor. The surge tank is at roof level, and that portion of the building is 84 ft above the lower floor.

RAIL AND HIGHWAY CONNECTIONS

The plant is served by the Nashville, Chattanooga, and St. Louis Railroad with connections near Atlanta to the Southern, Louisville and Nashville, Central of Georgia, and Georgia railroads. There are three miles of track in the classification yard and 11,000 ft of track serving the main assembly building, warehouse, and coal storage yard.

Automobile traffic is served by a four-lane paved highway for busses and automobiles and 3,000 ft of trolley track within the plant property. Trolly service is provided from Atlanta and Marietta, Ga.

Before the site for this plant was selected, a careful study was made of the possibil-



Administration Building, the First Unit Completed

FINAL ASSEMBLY AND CLEANUP BUILDING CONSISTS OF FOUR PARALLEL HANGARS

ity of obtaining an adequate source of power. The fact that such a source was available contributed substantially to the selection of the site. A short distance north of the plant, the Georgia Power Company has a double-circuit 110-kv transmission line which is a part of their 110-kv transmission network, and which is the principal tie between the large Atkinson Power Station at Atlanta and the Alabama Power Company and the TVA to the west. It is adequate to supply the project and has the further advantage that the power can come from either of two directions, which will be of material assistance in assuring continuous service.

In the electrical system, the total connected load is about 43,000 kva, with an estimated demand factor of 70%. The estimated maximum demand of 30,000 kva is composed of 13,000 kva for lighting and 17,000 for power. This is about like the demand of a city of 100,000 population.

From the transmission line a single-circuit wood H-frame line was extended to a substation adjacent to the Main Assembly Building. The substation steps the 110-kv transmission voltage down to 12 kv, which is the plant primary voltage. Eight 12-kv underground feeders lead to the principal load centers throughout the plant. At the load centers the 12-kv voltage is stepped down to the utilization voltage. Unit substations, having a rating of 750 kva, and consisting of a three-phase air-cooled transformer with a number of air-circuit breakers, are generally used. There are 40 of these units with a total self-cooled capacity of 30,000 kva.

WATER SUPPLY

The water supply for the whole plant is furnished through a 20-in. steel water main from the city of Atlanta. This main is 46,000 ft in length and was constructed by the Goverment for the city. When it was completed, the city paid the Government its cost in full. This new line has a capacity of approximately 4 mgd.

At the northeast corner of the reservation, a booster pumping station takes the water from the 20-in. supply main and delivers it into two 2,000,000-gal ground storage reservoirs located near the assembly plant. This booster pumping station is equipped with two 2,000-gal per min electric-driven pumps and one 2,000-gal per min gasoline-driven standby unit.

The reservoirs were provided to insure an adequate water supply against normal contingencies. Since there are two of them, damage to the supply main or to one of the reservoirs could be repaired without interrupting the service. It is anticipated that 4,000,000 gal of storage will provide sufficient water for normal operations over a period of two days.

A high-service pumping station has been provided, which takes its suction from the ground storage reservoirs or the supply main from the booster station and feeds into the water distribution system supplying the assembly plant. This station is equipped with the following pumps:

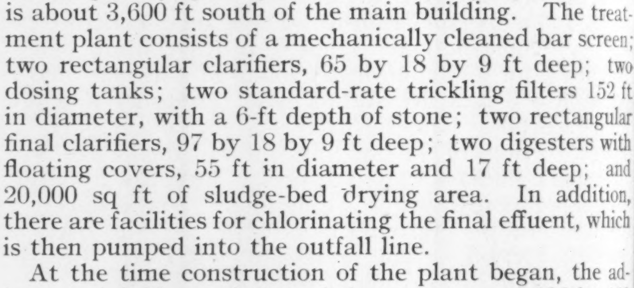
No.	Gal per Min	Drive
4	750	Electric
1	4,500	Electric
1	4,500	Gasoline engine
1	2,000	Electric

There is adequate pumping capacity to meet the water requirements in the event of a power failure or mechanical failure of one of the pumping units.

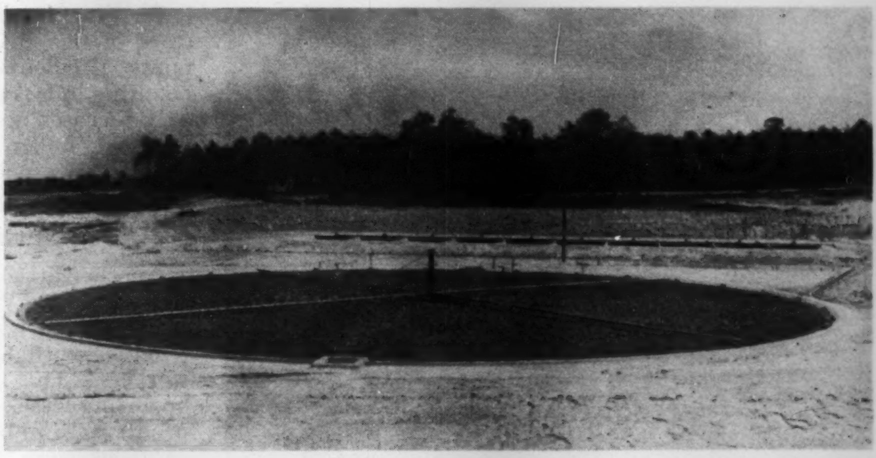
The main assembly plant, including the paint shop and the final assembly building, is encircled with a 16-in. distribution main from which numerous connections lead into the buildings. Adequate pipe sizes have been provided to insure a fire flow of 4,000 gal per min at a residual pressure of 10 lb per sq in. for the main assembly building, and a fire flow of 4,000 gal per min with a residual pressure of 35 lb per sq in. for the deluge sprinkler system in the paint shop.

The sanitary waste from the large plant receives complete treatment, which is required because the effluent is discharged into a small tributary of the Chattahoochee River. The sanitary wastes from the plant are collected through a complete underground system and discharged by gravity to the treatment plant, which is about 3,600 ft south of the main building. The treatment plant consists of a mechanically cleaned bar screen; two rectangular clarifiers, 65 by 18 by 9 ft deep; two dosing tanks; two standard-rate trickling filters 152 ft in diameter, with a 6-ft depth of stone; two rectangular final clarifiers, 97 by 18 by 9 ft deep; two digesters with floating covers, 55 ft in diameter and 17 ft deep; and 20,000 sq ft of sludge-bed drying area. In addition, there are facilities for chlorinating the final effuent, which is then pumped into the outfall line.

At the time construction of the plant began, the adjacent airfield, consisting of three runways 4,000 by 150 ft, had just been completed by the Civil Aeronautics



MACHINE SHOP IS IN THE MAGAZINE SECTION
There Are Three Floors in This Area



One of Two Trickling Filters at the Sewage Treatment Plant

Administration. The runway pavement consisted of a 6-in. soil-cement base and a 2-in. asphaltic concrete wearing surface. After a careful engineering study, it was decided to use concrete in expanding and strengthening the runways in order to support the heavy planes to be turned out. For the large additional program of extending the runways and connecting the taxiways, over four million cubic yards of excavation was required.

Based on a design for limited operation, the new cement concrete pavement on extensions to existing runways was constructed of 12-8-8-12-in. section in most areas, and 10-7-7-10-in. section in certain other areas. The subgrade was stabilized with a chert cushion to provide required bearing values.

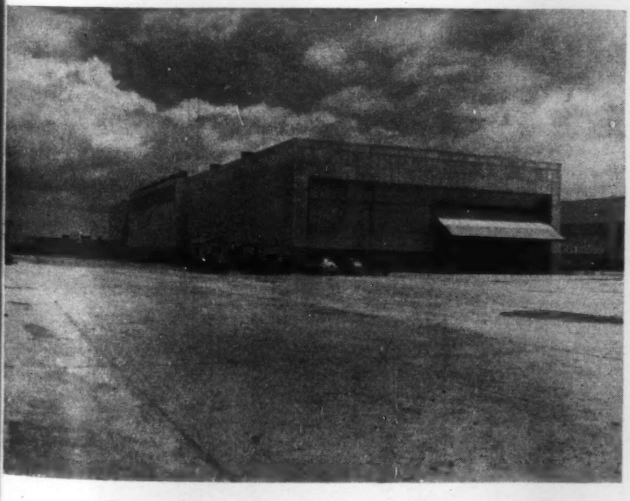
Reinforcement of the original pavement required a 3-in. course of chert as a leveling cushion upon which a uniform thickness of 6 in. of cement concrete was placed. On this portion of the flying field, the present total thickness of the pavement is 17 in., composed of 6 in. of soil-cement, 2 in. of asphaltic concrete, 3 in. of chert, and 6 in. of cement concrete. The completed airfield includes three runways 6,000 by 150 ft, containing about 300,000 sq yd of concrete pavement. Taxiways, parking and service aprons contain about 250,000 sq yd. The taxiway connecting the main assembly plant and the airfield is $1^1/_2$ miles long by 75 ft wide, a total of 66,000 sq yd. All the pavement on the airfield has about the same yardage as 58 miles of 18-ft paved state highway.

Highlights of Construction Management

By A. G. Stanford

Project Manager, Robert and Company Associates, Marietta, Ga.

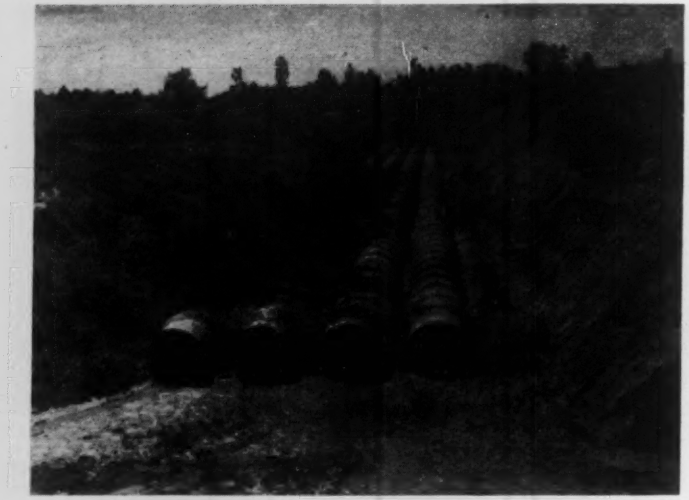
On February 24, 1942, the U.S. Government awarded to Robert and Company Associates what is known as an A.E.M. (Architect-Engineer-Manager) contract for handling all architectural and engineering design work, supervision and construction management, and other services for the Marietta Aircraft Assembly Plant. Six days later, on March 2, a temporary combined Area Engineer and A.E.M. office was opened in the triangular building at the junction of Peachtree and West Peachtree streets at Baker Street, in Atlanta. This downtown office was used for two months, or until May, when all Area Engineer and A.E.M. activities were moved to the project site, to offices in a temporary administration building, of two story frame construction, containing over 33,000 sq ft that had been erected in 30 days under contract for that purpose.



Process Paint and Storage Building
Note Large Area of Paved Taxiway

The primary purposes in devising the A.E.M. type of contract were to make possible the start of construction as rapidly as plans could be completed, and to spread the award of separate and distinct contracts to numerous prime contractors. The work on the Marietta plant has been awarded, in a total of 126 separate construction, supply and service contracts, to 78 separate contractors. In addition, a total of 2,095 contracts and purchase orders were placed for manufacturing equipment in accordance with Bell Aircraft Corporation's requirements. While no check has been made in this regard, probably no other A.E.M. contract in this country has been spread over so large a number of construction contractors.

As originally negotiated, A.E.M. contracts stipulated the percentage and nature of the total construction work which the contractor expected to perform with his own forces and equipment, the remainder to be let to other contractors. However, the contract further stipulated that any part of the work that could not be let on separate contracts to the best interests of the Government as to cost and completion date should be handled by the A.E.M. with its own forces. From past experience the company was reasonably confident that a vast majority of the work could be satisfactorily placed on separate contracts. This was pure optimism, however, since in the early spring of 1942 labor and material costs were rising, and rigid restrictions were being placed on the procurement of many critical materials. Therefore no one could foresee, three, six, or ten months in advance, what the reactions of general contractors would be towards bidding on a lump-sum, or where necessary a unit-price



AIRFIELD DRAINAGE REQUIRED INSTALLATION OF 4-FT CONCRETE PIPE CULVERTS

basis, on large-sized contracts with stipulated completion dates. With the exception of the work of the A.E.M., no other work could be contracted for on a cost-plus basis.

Tucked away in the official A.E.M. contract was an innocent-appearing clause which covered a vast amount of territory. This clause specified that the A.E.M. contractor should perform "any other duties and service as directed by the Contracting Officer," in this case the Project Area Engineer. It is amazing what ingenuity and resourcefulness can be exercised by Area Engineers in unearthing new and additional services for the A.E.M. to handle.

SPECIAL TYPE OF INSURANCE COVERAGE

For instance, after several construction contracts had been let, it was decided that it would be to the advantage of the Government for the A.E.M. to furnish all insurance to contractors covering public liability, workmen's compensation, and comprehensive automobile liability. While this particular item cannot be attributed to the Area Engineer, it was adopted by the Government as a means of effecting economies, since all insurance carried by the A.E.M. on contractors' operations was to be covered on the War Rating Plan, which limited the profit that could be made by insurance carriers to a fraction of what would have resulted from normal premium rates if paid separately by each contractor. This move required the A.E.M. to be responsible for the operation of a field infirmary, ambulances, and numerous first-aid stations throughout the construction period.

It may be of interest to mention that the insurance premiums paid out by the A.E.M. to cover all the normal contractors' coverages amounted in round numbers to $170,000 which is approximately one-half of what the total premiums would have been, based on standard rates, had each contractor been required to carry his own insurance and include it in his contract price. Also, this amount is subject to further reduction when the total of all costs to the insurance carrier can be ascertained.

It is believed that the accident record on this project falls well within the lower brackets of normal expectations for construction work of this character. While there have been many minor accidents requiring first-aid treatment, many resulting in loss of time for a day or two, there have been only 62 cases up to February 1, in which payment was required under the Workmen's Compensation Act. This number includes the only three fatalities attributable to work on the project.

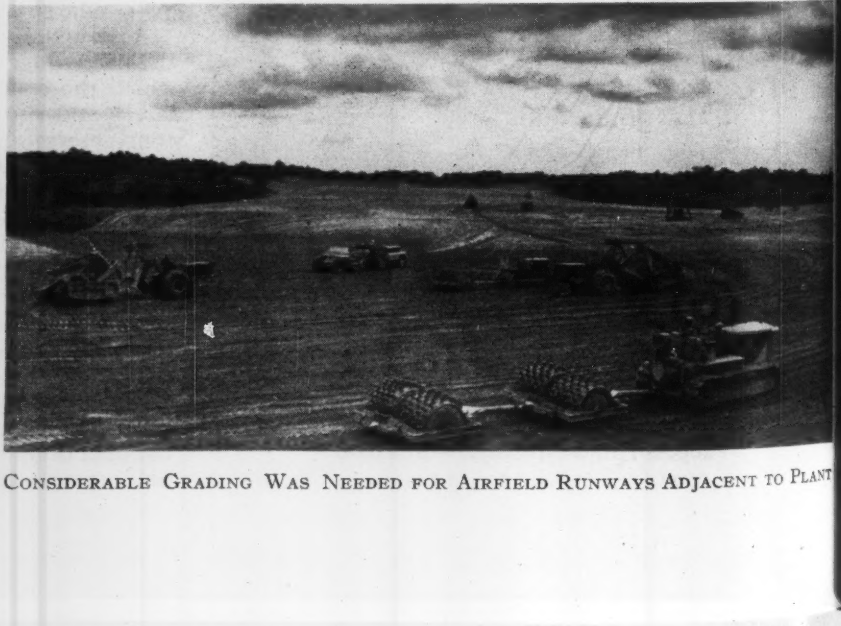
CAFETERIA SERVICE INSTITUTED

Another little item which sounded innocent enough at the beginning was the request that the A.E.M. operate a suitable cafeteria for office and field supervisory forces, together with the necessary canteens for construction workers. This was to be handled on the basis that any operating losses were to be paid by the A.E.M., but any profits were to be turned over to the Government. Five canteens were operated and a cafeteria, which served only the noon meal to some 600 office and supervisory employees.

The A.E.M. was most fortunate in its selection of operating personnel for the cafeteria and canteens, with the result that excellent food was served at reasonable prices. It was found possible to serve meals, cafeteria style, consisting of an entree, two vegetables, salad, dessert, bread and drink, at a price rarely exceeding 45 cents, even when cafeteria prices were the highest. Prices were continually adjusted and reduced in the effort to break even. Some surplus was built up during the earlier months with the expectation that losses would occur during the tapering-off period. Strange to say, the losses did not materialize, with the result that for the last several weeks of cafeteria operation the price of all servings of food and drink was reduced to 2 cents each, and occasionally a package of cigarettes was thrown in for good measure, also at 2 cents.

During this period visitors to the cafeteria were startled to find themselves at the cashier's desk with a check for 10 or 12 cents for a complete meal, including half of a broiled or fried chicken. Facial expression made an interesting study when someone was torn between the desire to ask if a mistake had been made and the fear that an affirmative answer would be received. Total sales in the cafeteria and canteens amounted to over $344,000, and even with the final splurge of low-priced meals, we ended up with a surplus of approximately $14,000 which has been turned over to the Government.

In the case of all construction, supply, and service contracts, the contractor held a prime contract with the Government, and was in no official sense a subcontractor of the A.E.M. However, the Construction Management



CONSIDERABLE GRADING WAS NEEDED FOR AIRFIELD RUNWAYS ADJACENT TO PLANT uties of Robert and Company Associates required that he A.E.M. exercise substantially the same supervisory unction for all contracts as would a general contractor or his subcontractors. While each contractor was expected to order his own materials and procure the necesary labor, it was found necessary for the A.E.M. to perate an employment and personnel office, to assist n securing both skilled and unskilled labor, and to do the ecessary processing of employees as to fingerprinting, adges, etc. This office worked in other ways for the eneral good of the job as a whole. For instance, no conractor was permitted to dispense with the services of ny employee without giving him a termination slip and assing him through the employment office. In this way t was frequently possible to transfer workers from the ayroll of one contractor to that of another who was rgently in need of additional help.

Throughout the major part of the construction period, carcity of labor was a serious factor, which at times hreatened to upset the scheduled completion date on any contracts. This was particularly true in the case f riveters. The progress schedule had been based on orking 25 riveting gangs during most of the period of tructural-steel erection. At no time was it possible to ecure this number, and the actual number working veraged perhaps 16. In other skilled crafts the shortage f manpower gave real meaning to the current expression, "too little and too late."

MEETING THE PROBLEM OF LABOR TURNOVER

Difficulties of transportation and hardships incident o work of this character in the winter made the labor urnover exceptionally high. For several months the urnover ran considerably above 100% per month. At he peak of construction activities, the total number of onstruction workers averaged only between 6,000 and ,500. Yet—and this is significant—from the start of he construction work up to February 1, 1943, a total of ver 42,000 workers were employed and processed hrough the personnel and employment office.

The situation with respect to common labor was paricularly trying. To relieve it and to make available ecessary labor of this type for contractors who required t spasmodically or in widely varying numbers, the .E.M. carried on its payroll for several months a large ool averaging 700 or 800 laborers daily, which were "farmed out" to any of the contractors, and otherwise sed on road work, drainage, clearing, and other maintenance activities being carried on by the A.E.M., which were flexible in nature and did not require a scheduled time for performance. In this way the laborers had the feeling of being steadily employed and not subject to the whims of the weather and the changing requirements of the many contractors.

ACCESS TO MAIN ASSEMBLY PLANT IS THROUGH FIVE TUNNELS FROM THE HEADHOUSES

Forms for One Tunnel Shown

Another A.E.M. side line was the operation of all project railroad facilities, including three locomotives with sufficient switching crews for 24-hour service, to classify and spot cars in accordance with the needs of the contractors and to return empties to the transfer tracks. For many weeks incoming materials averaged 150 to 200 cars a day. The daily receipt of such a volume of freight introduced a problem of unloading not only to relieve railroad facilities on the project, but also, and more important, to return cars for prompt re-use.

To reduce to a minimum the time lost by office and construction workers in visiting their tire and gasoline ration boards, a rationing office or panel was established by the A.E.M. on the site and duly authorized to issue supplemental gas coupons and tire certificates. A rigid share-the-ride plan was enforced to such an extent that private vehicles averaged four passengers each. Much favorable publicity attended the operation of this plan, so much that it became known to the National Office of Price Administration as the "Marietta Plan." Its features have been put into effect at other war plants and construction projects.

As construction activities reached full swing, it became vitally necessary to aggressively expedite the delivery of all manufactured materials and their passage through the plants of vendors and subvendors. Accordingly an Expediting Section was set up by the A.E.M. with an office and field force which finally numbered 14. Contractors were required to file promptly with this section copies of all purchase orders, and thereafter the section handled all follow-up and expediting. This required close coordination between the Expediting Section and the contractors to provide a daily schedule of material needs. When necessary—and cases in this category were many—expediters were sent to producers' plants,

STEEL FOR MAIN ASSEMBLY BUILDING WAS ERECTED AS FAST AS IT COULD BE OBTAINED

BASEMENT BEING CONSTRUCTED UNDER PART OF MAIN ASSEMBLY BUILDING
Contains Locker Rooms, Cafeteria, and Storage Space

and literally camped on the job until shipments were effected or manufacturing schedules were worked out and put into effect to insure positive results. Transportation was also followed very closely. While the A.E.M. normally refrained from designating the actual routing of shipments, daily routing information was received on all carload and less-than-carload shipments, whether by railroad or truck, and a transportation expediter worked diligently at all times to follow these shipments through to final delivery.

WORK SCHEDULES EVOLVED AND COORDINATED

In order to coordinate the activities of all the contractors, and to insure the carrying out of completion schedules in so far as was humanly possible, an extensive system was set up by the A.E.M. and handled by its Control Section. Within a few days after the award of each contract, the contractor was required to submit construction schedule charts broken down into extreme detail to show the starting date, weekly percentage, and completion date of all phases of his operations. These charts were carefully reviewed by the Construction Management branch of the A.E.M. for compliance with contract completion dates, and principally for proper coordination with the work of other contractors. In the majority of cases, it was necessary to work out with the contractors certain modifications in their proposed schedules, where the overall construction sequence so indicated. Finally a working schedule was evolved for each contract which the contractors were thereafter compelled to follow to the best of their ability, in all matters over which they had control.

The work of all contractors was daily reported and indicated on individual construction charts. These were revised weekly to reflect any major changes due to materials, etc., which would definitely affect the completion dates of any part of the work. The control section also handled the preparation of the official semimonthly Field Progress Reports required by the Office of the Chief of Engineers. It was extremely interesting to note how closely the curves representing actual construction for the project as a whole followed the estimated curves prepared at the outset of the work.

To stimulate the work use was made of billboards and posters, some of which were designed to develop a competitive spirit between contractors. Suggestion boxes were placed around the project and constructive criticisms and suggestions solicited from all classes of workers. No important assistance was received from this source, however, since the suggestions were largely personal requests for increased wages, more ham in the sandwiches, elimination of the mud, and the like.

In December 1942 and January and February 1943, this area experienced a much heavier rainfall than usual. While no extreme or extended cold weather prevailed, the rainfall very seriously hampered work on all the principal buildings, since most of it occurred when side walls and roofs were under way. This meant that a tremendous volume of finish work and mechanical and electrical installations could not proceed until the various sections were dry. Anyone viewing the vast industrial area now, with its roads and paved sections surrounding buildings, finds it hard to visualize the sea of mud and water with which everyone had to contend during the earlier months of 1943. At times it seemed as though no amount of temporary road maintenance and the continuous application of crushed rock would affect the situation.

Credit for the excellent results obtained on this project does not fall to any single person, governmental office, or contractor, but was due to the truly remarkable cooperation among many groups. The A.E.M. worked directly under the U.S. Corps of Engineers, and a spirit of the closest cooperation was manifest at all times between the civilian and commissioned personnel connected with the office of the Atlanta District Engineer and that of the South Atlantic Division Engineer, and also between this group and those engaged directly on the project. Fortunately, with both these echelons located in Atlanta, much time was saved in settling matters of design and use of materials, since representatives of the higher authorities were always available either for conference at the site or by telephone. Their knowledge of the permissible use of critical materials and probable ease or difficulty in securing WPB sanction was also of great value.

From the outset the Bell Aircraft Corporation demonstrated its desire to be helpful and cooperative. Its representatives on the project under the direction of George Carson, Plant Engineer, acted as liaison between its main office and the design office on the project. Their knowledge of manufacturing sequences and requirements was of vital importance, naturally, in the proper design of the project as a whole. Many of the prime contractors showed an outstanding willingness to cooperate, often under very adverse circumstances, and all of these should be highly commended.

Large blueprint posters in the various offices on the project displayed the following quotation from the *Business Week* of December 1941:

> THE ONE THING TO WIN THE WAR
>
> That one thing is simply to deliver an honest day's work wherever we are called to serve. Honest work will win this war. Loafing will lose it. The showdown will be whether Hitler can drive his people to work harder than we are willing to work. There is no one to drive us. We must drive ourselves.

Those who participated in the construction of this project evidently took these words to heart, since it was clearly demonstrated at all times that the majority very genuinely and keenly desired to do their utmost to further the war effort.

Manpower in Construction

Part IV. Structure of Organized Labor and Labor Laws

By L. E. Brigham, M. Am. Soc. C.E.

Specialist on Labor Management, Office Secretary of War, Civilian Personnel Division, War Department,
Washington, D.C.

ORGANIZED labor in various forms has come and gone since Biblical times with the changes in society. The present American Federation of Labor crystallized through the activities of a group of artisans who organized in New Jersey about 1881 and were known as the Knights of Labor. Samuel Gompers served as the first president of the A. F. of L. from 1886 to 1924, and William Green has served in the same capacity from 1924 to date. The tendency was to pattern after the European labor system, but with the rapid growth of industry and basic changes caused by the replacement of hand methods by power, the development of organized labor in the United States has been truly American.

Organized labor has developed in this country and exists today mainly as a collective bargaining agency. However, any labor organization has three basic functions—collective bargaining; development of craftsmanship; and service to members, employers, and to the public.

Organized labor may be compared with an office building. The superstructure represents collective bargaining, the foundation is craftsmanship, and the people within represent the living element of service. The superstructure of collective bargaining is so predominant in the minds of both the public and labor members themselves that the other vital elements of craftsmanship and service are given little thought—yet if the foundation of craftsmanship fails, the elements of collective bargaining and service become valueless.

Labor unions have three basic types of organization:

1. Horizontal organization as represented by the A.F. of L.'s craft unions, in which membership is limited to a single craft, which covers an entire industry, such as the carpenters' union.
2. Vertical organization, as represented by the C.I.O., whose membership takes in all workers in a single industry or company, such as the Automobile Workers.
3. The "T" organization, which is a combination of the craft and industrial types. This type is exemplified by the Electrical Workers Union, which may include, with the electricians, all other workers of a public utility company, including office workers.

The existing "big four" in organized labor are at present the American Federation of Labor, the Railroad Brotherhoods, the Congress of Industrial Organizations, and the United Mine Workers of America, which recently applied for reentry into the A.F. of L.

The American Federation of Labor is, in fact, a federation in which membership is voluntary and elective, dependent upon the union's desire to operate under A.F. of L. jurisdiction and acceptance by the other member unions. All the building trades international unions belong to the American Federation along with similar internationals representing other trades and occupations. In construction, the organized labor dealt with is entirely unions affiliated with the A.F. of L. In the past, in a few cases, C.I.O. unions operated in the building trades, but these unions have been discontinued by arrangement between A.F. of L. and C.I.O. officials. In ship construction, which is considered essentially a manufacturing process, there is still competition between the two groups.

The structure of the A.F. of L., which is a coordinating agency for a number of unions, contains 19 international building trades unions. Each of these has field offices in principal cities—a total of 190 for the 19 unions. It is the responsibility of these field offices to supervise and assist the 7,500 local building trades unions, which have an estimated total membership of 1,417,000. Within the structure of the A.F. of L. also is the Building Trades Department, which unifies the activities of the 19 international building trades unions and also has established 500 local building trades councils, whose responsibility it is to unify the activities of the 7,500 local unions. This council is generally composed of the business agents and officers representing the various local building trades unions.

Three types of membership are generally found in each local union—journeyman or mechanic, apprentice, and helper. The apprentice system is gradually supplanting the helper system in most crafts. The apprentice is one who learns the trade and eventually becomes a journeyman. Apprenticeship is an all-important factor in maintaining the unions' standards of craftsmanship. Aided by the Apprentice Training Committee originally set up under the Department of Labor, the apprenticeship system is very gradually coming back into its rightful place.

An important development in recent years has been for some unions to break down their membership into various subclassifications according to the type of work performed, resulting in increasing wages. While this practice is not confined to any particular union, the grouping in the Laborers and Operating Engineers unions is indicative. For example, a recent agreement consummated between contractors and the Laborers Union, includes rates for 54 separate classifications under the jurisdiction of this union.

The structure of organized labor is fundamentally democratic, with the motivating elements of money and votes flowing from the bottom up. The international officers are selected through a system of delegates. Their term of office is in effect indefinite, and when once elected the international union officers usually hold office for a considerable period. The international unions have (but seldom use) life and death power over the local unions and their officials; they can take away their charters or suspend or discharge their officials.

Many long-range thinkers in organized labor realize that real progress by labor has been bogged down by an unwieldy membership dilution of craftsmanship and cumbersome labor legislation. The following list gives by popular title the principal federal labor laws and resulting developments which affect construction. The accelerated tempo in labor legislation during recent years is to be noted. Of the regulative actions taken in a span of about 60 years, approximately 70% have occurred in the last 12 years. In many instances the federal acts listed were preceded by similar legislation and followed by various amendments and executive orders.

FEDERAL ACTS AND RESULTING DEVELOPMENTS AFFECTING CONSTRUCTION LABOR

1885, Feb. 26, Contract Labor Act. Prohibited importation of aliens who had prior contracts for employment.

1886, June 29, Trade Unions Act. Legalized national trade union organization activities, including aid for its members to become more skilled and efficient, regulation of hours, wages, etc.

1887, Feb. 23, Convict Labor Law. Prohibited employers from contracting with prisons for convict labor.

1892, Aug. 1, Eight-Hour Law. Limits work day to eight hours for laborers and mechanics operating machinery on river and harbor dredging and excavation.

1905, May 18, Convict Labor. Through Executive Order the employment of persons undergoing sentences of imprisonment at hard labor was prohibited on public contracts.

1907, Division of Employment Information. Established under Bureau of Immigration and Naturalization, Department of Commerce and Labor, the start of the present U.S. Employment Service.

1908, May 30, Employees' Compensation Act. Provided for accident compensation and death benefits to U.S. employees.

1912, June 19, Eight-Hour Law. Laborers and mechanics (only) employed by contractors on public works are prohibited from being worked over 8 hours per day.

1913, March 4, U.S. Department of Labor. Established.

1913, March 4, U.S. Conciliation Service. Established as a function of the Department of Labor. The service is entirely voluntary. There are over 100 Commissioners of Conciliation operating under regional supervisors in various regions.

1916, Aug. 29, Council of National Defense Act. Provided for coordination of industries and resources for National Security including labor functions.

1917, Feb. 5, Immigration Act. Established general selective procedure which greatly limited the influx of "old country" mechanics. Various quota laws were later enacted.

1917, Feb. 23, Smith-Hughes Act. Established federally aided vocational education, including the training of mechanics and apprentices employed in the building trades.

1918, Jan. 3, U.S. Employment Service Unit. Established in Department of Labor.

1921, Nov. 9, Federal Highway Act. Included provisions for compliance with state labor laws and federal rules and regulations.

1926, Railway Labor Act. The first law passed by Congress specifying the right to organize without interference and coercion. Applied only to railway employees.

1927, March 4, Longshoremen's Act. Provided compensation for disability or death of civilians, administered by the U.S. Employees Compensation Commission.

1931, Feb. 10, Employment Stabilization Act. Provided for advance planning and regulated construction of public works and established a Federal Employment Stabilization Board.

1931, March 3, Davis-Bacon Act. As amended in 1935, requires that minimum prevailing wages be established for mechanics and laborers on all federal construction contracts in excess of $2,000. These minimum wages are determined by the Department of Labor.

1932, March 23, Anti-Injunction Law. Regulates the issuance of injunctions by federal courts in cases of labor disputes.

1932, June 30, Convict Labor and Goods. Prohibited on federal contracts through rider to appropriation act.

1933, July 6, Wagner-Peyser Act. Established U.S. Employment Service under Department of Labor.

1934, June 13, Copeland Anti-Kickback Act. Prohibits deductions from employees' earning or the return of any portion of wages to the employer.

1935, July 5, Wagner Act. Guarantees the right of workers to organize and bargain collectively through unions of their own choosing. Declares that it is the public policy of the United States to encourage the practice and procedure of collective bargaining.

1935, Aug. 14, Social Security Act. Sets up ten social insurance programs to provide unemployment compensation and assistance to the needy. The present U.S. Employment Service was set up under this act.

1936, May 20, Rural Electrification Act. Includes standards as to hours and wages.

1936, June 24, Anti Strike-Breaker Act. Prohibits the transportation of strike breakers.

1936, June 30, Walsh-Healy Act. Provides for establishment of standards for wages and hours on all government supply contracts in excess of $10,000.

1937, August 16, Federal Apprenticeship Program. Provides for the promotion of apprentice training in trades and industry.

1937, Sept. 1, Federal Housing Act. Provides for the payment of minimum rates of wages as determined by the Department of Labor on construction of rental projects.

1938, June 25, Fair Labor Standards Act. Established standards for wages, 40-hour week, and time and $^1/_2$ for overtime, applicable to all work pertaining directly to interstate commerce.

1940, Sept. 9, Overtime Work. Permitted for mechanics and laborers in excess of 8 hours per day provided that not less than 1 and $^1/_2$ times the basic rate be paid, through rider to appropriation act.

1940, Sept. 13, National Defense Contracts. Communication by the President to Congress outlining guiding principles for defense contracts, including hours and overtime at prevailing rates for laborers and mechanics, as established by Advisory Commission, Council of National Defense, Act of August 29, 1916.

1941, March 19, National Defense Mediation Board. Established by Executive Order 1816, to settle labor disputes which cannot be adjusted by the Conciliation Service of the Department of Labor, and are certified to the Board by the Secretary of Labor. Later superseded by War Labor Board.

1941, March 23, Extension of Davis-Bacon Act. Required the use of Davis-Bacon minimum-wage determination on cost-plus-a-fixed-fee contracts.

1941, June 25, Anti-Discrimination Order. Established through Executive Order 8802, whereby there shall be no discrimination as to employment on account of race, color, creed, or national origin.

1941, July 22, Stabilization Agreement. Established by informal agreement between representatives of government contracting agencies and building trades unions, A.F. of L., and later ratified by department heads. Provides for stabilization of conditions as to wages, hours, and overtime, also prohibits work stoppages and sets up a Board of Review to settle disputes.

1942, Jan. 12, War Labor Board. Established through Executive Order 9017, superseding the National Defense Mediation Board and given the function of settling disputes with powers of compulsory arbitration. Operates through 12 regional boards and several subcommissions.

1942, Jan. 16, War Production Board. Established through Executive Order 9024. Labor functions: to promote the stabilization of wages, hours, and working conditions in war industries through collective bargaining.

1942, Jan. 30, Emergency Price Control Act. Controls wages and salary increases which affect price ceilings.

1942, Feb. 24, National Housing Agency. Established through Executive Order 9072. Involves all housing matters for civilian war workers.

1942, April 18, War Manpower Commission. First established through Executive Order 9139. Includes the U.S. Employment Service and promulgates broad policies covering labor utilization.

1942, May 22, Wage Adjustment Board. Set up by informal agreement between federal construction agencies and the Building and Construction Trades Department, A.F. of L. Purpose, to stabilize wage rates and provide for means of adjustment.

1942, May 29, Wage Adjustment Board Recognized. Secretary of Labor through Administrative Order 101, officially recognized the jurisdiction of the Wage Adjustment Board.

1942, July 9, Prison-Made Goods. Executive Order 9196 permits the government or its contractors to procure articles of any kind made in federal, state, or territorial prisons.

1942, Sept. 9, Overtime Compensation. Executive Order 9240 established standards of overtime compensation.

1942, Oct. 3, Wage and Salary Stabilization. Executive Order 9250 provides for the freezing of wages and salaries paid at this date and providing for adjustments through the War Labor Board or delegated authorities.

1942, Dec. 5, Controlled Recruitment of Labor. Under Executive Order 927 the War Manpower Commission may require all hiring through the U.S. Employment Service.

1942, Dec. 14, Wage Stabilization, Building Industry. Through General Order 13, the War Labor Board delegated the responsibility of adjusting wages in the building construction industry to the Wage Adjustment Board, subject to review by the War Labor Board.

1942, Dec. 24, Non-Manual Employee Wage and Salary Adjustments. Authority for approving increases of salaries paid on cost-plus-a-fixed-fee contracts delegated by the War Labor Board to War and Navy Department through General Orders 14 and 18, and by the Commissioner of Internal Revenue.

1943, Jan. 15, Shipbuilding Stabilizing Committee. Recognized by order of the War Labor Board as an official body in stabilizing wages in the shipbuilding industry.

1943, Feb. 9, 48-Hour Week. Established through Executive Order 9301 provides that the War Manpower Commission may establish a minimum wartime work week of 48 hours in designated areas and industries.

1943, April 8, Hold-the-Line Order, Little Steel Formula. Established through Executive Order 9328 whereby no wage or salary increases should exceed 15% over that prevailing January 1, 1941, with exceptions.

1943, June 7, Employment of Aliens. Joint statement of governmental departments granting full employment opportunities to all loyal and qualified aliens except on certain classified work where written consent of the government agency is required.

1943, June 25, Smith-Connolly Anti-Strike Law. Prohibits strikes in government-operated plants.

Federal labor laws and regulations that have the greatest effect on construction at the present time may be listed approximately, in the order of descending importance, as follows: Davis-Bacon Act, Wage and Salary Stabilization Order, Hold-the-Line Order, Controlled Recruitment of Labor, Building-Trades Stabilization Agreement, Overtime Compensation Order, Forty-Eight-Hour Work Week Order, Fair Labor Standards Act, Eight-Hour Law, Copeland Anti-Kickback Act, Walsh-Healey Act, and Convict Labor Law.

With the recent trend toward solving labor problems through legislation, the matter of labor administration has become complex. In the over-all economy of construction, this legal control, while important, is only a relatively minor item in total project cost. The smoke screen caused by the multitude of laws, regulations, boards, and decisions, must not divert the attention of the engineer from the all-important task of attaining good labor management.

Note: These discussions represent the opinions of the author, and do not necessarily reflect the policies or attitudes of any government agency.

A Small City Makes Postwar Plans

By **Clarke Gardner,** M. Am. Soc. C.E.
City Engineer, Salisbury, Md.

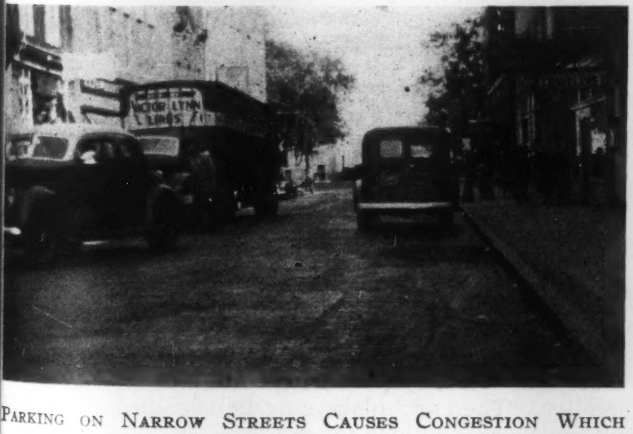
SMALL cities, as well as large metropolitan areas, are faced with the obligation of preparing for postwar rehabilitation by extending public works facilities. Among the matters suggested by Mr. Gardner for attention are preparation of a master plan of improvements, repair of streets, improvement of sanitation facilities, added recreational features, development of airports, neighborhood landscaping programs, zoning control in metropolitan areas, installation of parking lots, and the revamping of house numbering and street-name signs.

FIRMLY believing that much will depend on preparations made now to control the readjustments that will follow the termination of the war, Salisbury, Md., has under consideration a postwar and long-range plan of action. What is suggested for this community of 13,300 may be applicable to the needs of other small cities, and this brief outline may aid in stimulating mutually helpful ideas.

There are many problems in a community that call for the exercise of good judgment and foresight if business and governmental activities are to be coordinated for the benefit of the community as a whole. Since postwar and long-range planning not only affects business, but practically every citizen, a planning committee composed of representatives of the mayor and council, county commissioners, business and civic organizations, and other public-spirited citizens, was appointed on October 1, 1943. This Board is known as the Salisbury-Wicomico County Planning Commission. Its duties are to analyze various business and public projects referred to it, make a general study of financial and legal requirements, and be prepared to submit recommendations.

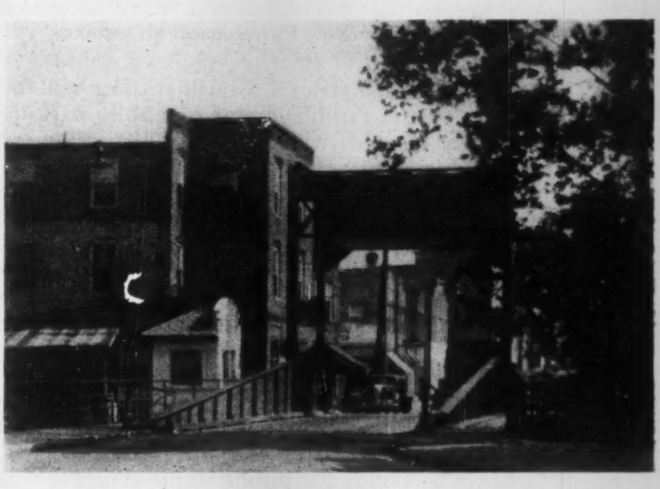
Public works are to be undertaken only on the basis of the essential need for them. Public works projects by themselves cannot and will not solve unemployment. The criteria for selecting public improvements, therefore, are how well they will promote the health, safety, order, and prosperity of the community. This points to the necessity for comprehensive surveys and studies of present conditions and anticipated future growth.

Consequently, a master plan and descriptive outline have been prepared. This plan includes the general location, character, and extent of streets, bridges, waterways, boulevards, parkways, playgrounds, public buildings, parks, airport facilities, and the general location and extent of public utilities operated for electricity, water, gas, drainage, sanitation, and transportation.



Parking on Narrow Streets Causes Congestion Which Planned Parking Lots Will Relieve

The plan also shows, in a general way, contemplated public improvements. These include adequate provisions for promoting safety from fire and other dangers, elimination of traffic hazards, installation of health and recreational facilities, and the promotion of good civic design and arrangement.



Replacement of This Narrow Lift Bridge Over the Wicomico River Is Planned

Maintenance and extension of streets and highways represent an important part of municipal development. For example, Salisbury has about 75 miles of streets, of which 40 miles are improved with a bituminous surface and $6^1/_2$ miles with concrete pavement. Owing to a combination of war restrictions and lack of appropriations, it has not been possible to provide proper maintenance. However, a reserve fund was recently established for this purpose, and plans also include provision for concrete gutters on present streets, improved with surface treatment and sidewalks. In the absence of sidewalks, combination curbs and gutters will be placed as soon as funds are allocated. The installation of these combination units will prevent deterioration of the edges of asphaltic pavements and will materially assist in drainage, particularly where flat grades are involved. Another matter that has been given attention is the installation of wider bridges at stream and rail crossings. The narrowness of many existing bridges is a definite hazard to vehicular traffic.

The general study of roads includes special consideration for transportation facilities to and from the municipal airport. Highway planning in the vicinity of the airport involves the development of a network of roads that will give all possible accessibility. Prewar traffic conditions have been reviewed in their relation to parking facilities. The lack of sufficient parking space adds to traffic congestion, particularly where there are narrow

A Developed Section of the Municipal Park—Further Developments Will Follow Established Standards

streets in the business district. Consideration will be given, therefore, to the establishment of public parking facilities, centrally located, which will assist in relieving postwar traffic congestion.

In Salisbury adequate facilities are lacking for the storage of vehicular equipment and other rolling stock used in connection with the operation of public works. Lack of space not only makes for improper "housekeeping" but leads to inefficiency in the storage of materials and equipment. The provision of a suitable garage and storage yard is planned, for it will undoubtedly save on overhead expense and improve the general efficiency of all municipal operations.

Development of property for business and residential purposes will be resumed after the war. In the past, frequent issuance of bonds for public improvements was necessary to keep pace with building programs. However, this method of financing all types of improvements cannot be considered satisfactory because of the continuous debt charges that must be assumed by the taxpayers. For sanitary sewer extensions, a plan has been considered which includes direct appropriations for limited extensions and utilizes an assessment method for a part of the construction cost.

Storm-water drainage should be coordinated with the development of streets. Therefore, a general design has been made showing storm-water drainage requirements in those sections of the city that do not yet have streets. Also, general studies have been made of the water system, including additional supply, fire-flow requirements, reduction of dead-end mains, and the efficiency of pumping equipment.

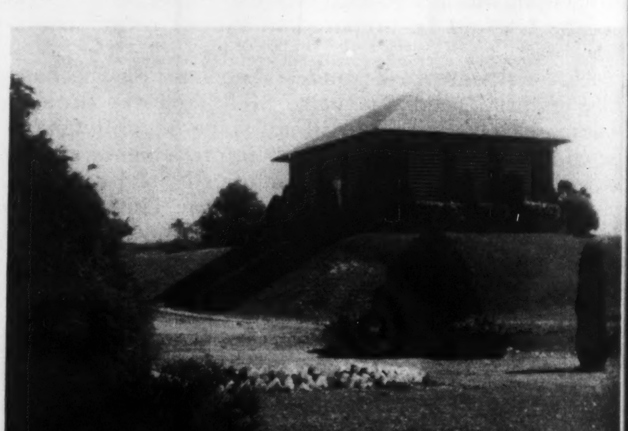
The development of parks and playgrounds with appropriate recreational facilities has been investigated. Swimming pools, log cabins, and picnic features provide attractive means of recreation for all age groups of the community. Salisbury has a centrally located municipal park, containing about 70 acres, which is about 40% developed. It contains a natural fresh-water lake, lagoons, small islands, and rustic foot-bridges, and offers recreation to visitors and citizens alike. Roadways, timber bridges, rustic benches, band stand, and tennis courts have been added. In order to realize the full potentialities of this park system, landscaping should be done at various locations, additional playground equipment installed, and other recreational facilities added. Supervised youth activities are a part of the program.

Salisbury is fortunate in having one of the largest airports (Class 4) in the Atlantic coastal area. Three 5,000 by 150-ft concrete-paved runways, capable of carrying 40,000-lb wheel loads, were recently completed on the 650-acre site. Serving a population of 200,000 within a 60-mile radius, and situated in the center of a diversified manufacturing and large agricultural region, it is predicted that Salisbury will be a major stop for passenger and air-cargo transportation. For these reasons, and possible defense needs, the master design provided a potential development of five additional runways, hangars, administration buildings, and other facilities being planned within the available financial means.

Within the city, the development of parkway plots and the planting of trees and shrubbery are now being planned. Even certain commercial highways and areas abutting on railroad rights of way are included in this category. Zoning control in the one-mile metropolitan areas abutting on the city limits is being considered for the purpose of providing adequate safeguards to future building activities and property development. A complete study of existing house numbering is to be made with the idea of devising a system for proper numbering in each block so as to eliminate existing duplications and inconsistencies. Such projects readily receive the endorsement of postal authorities and civic organizations. Coincidental with the house-numbering program, a plan has been drawn up for the erection of additional street-name signs. Work of this kind can be scheduled to extend over a limited number of years.

The establishment of complete and up-to-date property maps is also projected. Such maps will enable the city to provide a record of all real estate within its corporate limits. The maps will show lots, dwellings, widths, and names of streets. A map number, block and lot number will be assigned for identification. The maps, in conjunction with a card index system, will assist in the transference of property and enable the tax collector to adopt a system whereby it will be impossible to overlook taxable property. The maps and cards also will be an invaluable source of public information, besides being most useful in all planning operations.

In this manner, the city of Salisbury, Md., has taken "inventory" of its present status, and developed a general postwar plan. Proposed improvements can be scheduled over a period of years consistent with economic, financial, and social requirements. After all, city planning is merely the exercise of such foresight as will promote the orderly and sightly development of a community. Therefore plans may be classified as postwar, intermediate, and long range.



Municipal Aeration Plant—Water Supply Facilities Are to Be Enlarged

Now is the time to plan for future public works.

Large-Scale Power Projects Planned in South American Republics

By Charles A. Howard

Technical Director, Inter-American Development Commission, Washington, D.C.

South America too has had to face the restrictions of a wartime economy. Decreased shipping facilities and the impossibility of obtaining the products of industries in the United States have brought about many changes. Among them is the swing to hydroelectric developments forced by shortage of coal, which was formerly shipped from the United States. Many of these projects must wait until the war is over but a number have already been undertaken. Mr. Howard has listed projects contemplated as well as those already started with the thought that engineers and manufacturers of the United States may discover in South America opportunities that are mutually advantageous.

The continent of South America, while exceptionally well endowed by nature with mineral resources of great value, has extremely limited commercial deposits of coal. Most of the deposits that do exist are either insufficient in quantity, poor in quality, or badly located with reference to consuming centers. The need for importing large quantities of fuel places a heavy burden on the economics and finances of most South American countries.

Development of potential power resources is retarded now by the difficulty of importing equipment from the United States and Europe. Only power projects most essential to fill strategic material and civilian needs get priority on equipment. Nevertheless, wartime shortages of fuel and expansion of various industries have stimulated interest in long-range power programs.

MANY POTENTIAL POWER SITES

Many of the South American republics have large unexploited sources of electric power, especially Brazil (see "Water Power in Brazil," by A. W. K. Billings, M. Am. Soc. C.E., Civil Engineering, August 1938) and the mountain republics along the Andes. Chile, which is 2,600 miles long, seldom more than 100 miles wide, and contains mountains exceeding 20,000 ft in height, is an outstanding example of the Andean republics. In Central America also there are sites for possible hydroelectric installations, for example along the Lempe River in El Salvador. But the power needs of most of these republics are relatively small at the present time, and the initial cost of hydroelectric plants and transmission lines is relatively high. Therefore the utilization of this potential power will probably await the fuller industrialization of these countries.

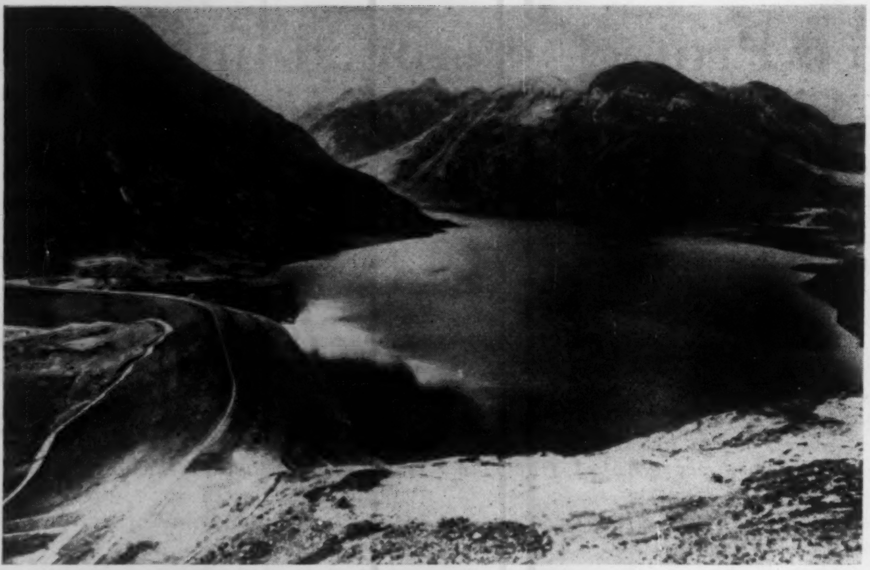
Mexico has many power sites but most of them are remote from centers of population. Since Mexico is blessed with an abundance of oil for fuel, it has not been under the same pressure to develop its power as have some other republics. Its National Electrical Commission has a large hydroelectric project now under construction at Ixtanpantongo in the municipality of Valle de Bravo, about 100 miles west of Mexico City. The first of three 38,000-hp generators will soon be installed.

Both Chile and Uruguay have nationalized the future production of electric power within their borders and have programs for the complete electrification of their public services, industries, and railroads. While Uruguay is not a mountain republic, its electrification program is one of the most advanced in South America because of long efforts to avoid the importation of coal and oil for fuel.

Uruguay is fortunate in having a fine site for water-power development right in the middle of the republic, and only 150 miles from the city of Montevideo. Work on the 3,800-ft dam for this development on the Rio Negro, to impound the largest artificial lake in South America, was begun in 1937. However, on account of the war, the original European contractor could not finish the work, including the installation of four generating units to develop a total of 128,000 kw, and the job was turned over to a United States organization. One 32,000-kw turbine generator will soon be installed and a transmission line to the city of Montevideo erected, thereby reducing that city's dependence on imported fuels. The total cost of the Rio Negro project, including four generators, the dam and transmission lines, is reported to be approximately $35,000,000.

Several other water-power and irrigation projects are included in the long-range plans of Uruguay. These are a dam on the Queguay River just north of the city of

Chile Has Tapped the Energy of the Laja Falls, Which Drop 130 Ft
A New Plant Will Develop 40,000 Kw for Use in Concepcion



RUGGED TERRAIN IN PERU PROVIDES MANY IDEAL SITES FOR STORAGE
This Is the Pomococha Dam

Paysandu, to develop 8,000 kw; a dam on the Arroyo Cunapiru, in the north, to develop 10,000 kw and to serve the cities of Rivera and Tacuarembo; and a dam on the Cebollati River, in the eastern part, to develop 11,000 kw for Maldonado, Treinta y Tres, and other communities.

While the rainfall of Uruguay averages 50 in. a year, it fluctuates between 25 and 72 in. There are frequent and sometimes serious periods of drought when it may not rain for months at a time. Uruguay is just now recovering from one of its worst droughts in 40 years.

MANY SITES AVAILABLE IN CHILE

Chile's principal centers of potential hydroelectric energy, according to the plans of the Chilean Development Corporation, are in the Aconcagua region to the north of Santiago, in the Rancagua region along the Rapel River just south of the capital, and in the Orsorno region which includes the chain of lakes in the south of the republic.

While the rivers of Chile are not large, they plunge down from great heights to the sea and offer sites for high-head installations. Some of the lakes are well located for power development. In some of the southern provinces the rainfall exceeds 100 in. a year. The lakes, waterfalls, and rapids of southern Chile provide many power locations for chemical plants, smelters, and other large users of cheap power. Sites for hydroelectric plants have been surveyed at Tocopilla, Copiapo, La Serena, Coquimbo, Sauzal, Orall, Lontue, Maule, Leja, Pilmaequen, and El Volcan.

The Aconcagua system will be used largely in the production of portland cement. This plant, together with other power stations, also will contribute to the electrification of the railroads and provide power for new industries. At the present accelerated rate of consumption, it is estimated that the industries of Chile will consume 600,000 tons of cement per annum by 1945, or nearly double the production of 1939. Chilean interests have purchased two unused cement plants in the United States which are to be dismantled, shipped, and set up in the vicinity of Coquimbo, Chile.

Guillermo More, Chief of the Department of Energy and Combustibles of the Development Corporation of Chile, describes the work in the four zones of activity of his department as follows:

"In the southern zone in the vicinity of the estuary of Reloncava and Porte Montt, surveys have been made for the 'Ralun' generating plant which will use the waters of Lake Todos los Santos and will produce 50,000 kw of initial power and at least 126,000 in full development. Todos los Santos is one of a chain of beautiful lakes. It is 22 miles long, 500 ft above sea level, and only 15 miles from the coast. The nearby and smaller Lake Chapo can produce 39,000 kw at a proposed site known as 'Canutillar.'

"In the zone of Valdivia-Corral, the 'Manio' plant on the San Pedro River can produce 50,000 kw with a possible ultimate production of 125,000 kw. A 36-mile transmission line will bring the power to Valdivia, and 20 miles more will bring it to Corral.

"In the zone of Talcahuana-Concepcion-Penco, the 'Abanico' plant on the River Laja is now under construction with an immediate potential of 40,000 kw and a final capacity of 100,000. A 100-mile transmission line connects with the city of Concepcion. The extraordinary economy achieved in the construction of the plant warrants this unusually long transmission line. This is the most economical of all the plants included in the program.

"In the zone of San Antonio, just south of the city of Santiago, the 'Rapel' plant is to be installed on the Rapel River with an initial capacity of from 60,000 to 120,000 kw. A transmission line of 34 miles will connect with the port of San Antonio. Work has not yet begun on this dam but the plans are far advanced."

The Development Corporation of Chile has agreed to allocate the sum of 900 million pesos for the construction of this hydroelectric plant on the Rapel River. This, it is said, will be the largest installation of its type in South America, involving the use of three million cubic meters of water. A part of the power will be used to electrify the state railways. The copper plant, with a capacity of 30,000 tons of finished copper a year, which Chile re-

C.I.A.A. Photo

ELECTRIFIED SECTION OF THE PAULISTA RAILROAD NEAR SAO PAULO, BRAZIL cently purchased from the United States, will produce copper wire for this national electrification program.

At Sao Paulo, Brazil, the Lages Power House Utilizes Potential of a Precipitous Slope to the Coastal Plain

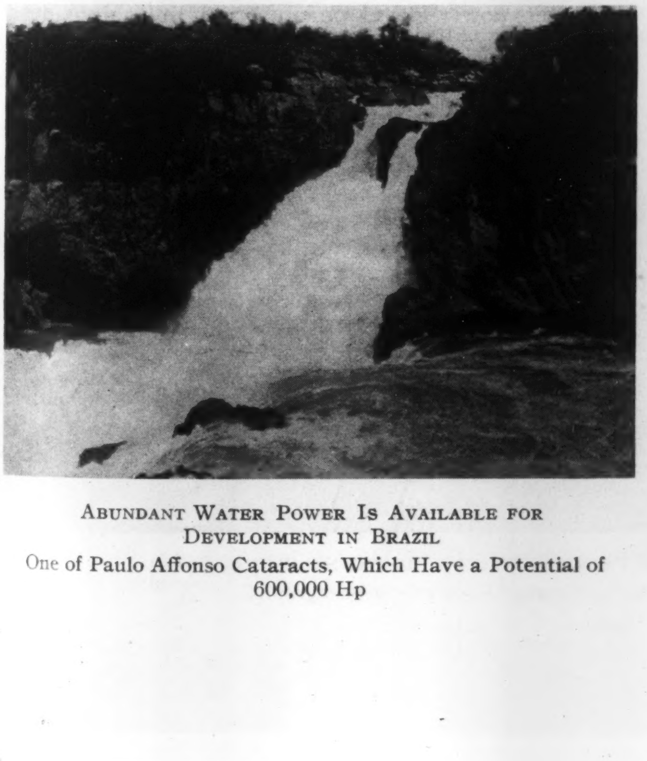
BOLIVIA, A MOUNTAIN REPUBLIC

Bolivia, as one of the mountain republics, has large reserves of hydroelectric power. Plants developing some 30,000 kw are at present supplying light to cities and power to mines. But this is only a fraction of the total possibilities in this field. Some authorities estimate that up to 4,000,000 kw could be developed in this republic on the eastern slope of the Andes if the power could be used. Lake Titicaca, it is believed, could be made to produce 700,000 kw, which is more than is now secured from Boulder Dam. However, there is no market for this amount of power in Bolivia at the present time.

Colombia now has a total of 346 electric plants, of which six belong to the national government or to the departments, 199 to municipalities, and 141 to private interests. Together they produced 293,782,493, kwhr in 1942 with a value of 10,817,192 Colombian pesos. The consumption of electric power in Colombia more than tripled between 1933 and 1942, the total amounting to 310%.

Colombia is now considering the construction of a plant in the vicinity of the city of Manizales, in the Department of Caldes, to serve the industries of this region, the cost to be in the neighborhood of 2,000,000 Colombian pesos. A 12,000-kw hydroelectric plant is planned for the Paez River between Paicol and Carnicerias, Department of Huila, and another for Florencia in the Caqueta district at a cost of 70,000 pesos. Other activities include the completion of the hydroelectric plant at Trumeque, Department of Boyaca, and the beginning of work on a station at Titiribi, Department of Antioquia.

A recent Colombian law, known as the Economic Plan, authorizes the issue of 50 million pesos in internal, 4%, 30-year bonds to be used in part for the nationalization of public utility enterprises now privately owned. Interest and amortization are to be met by the income from the enterprises nationalized.



Abundant Water Power Is Available for Development in Brazil

One of Paulo Affonso Cataracts, Which Have a Potential of 600,000 Hp

RECENT EXPANSION IN PERU

The government of Peru, with the aid of an Export-Import Bank loan, is building a large hydroelectric development at Canon del Pato on the Santa River, which flows into the Pacific just north of Chimbote Bay. Work on this project was initiated in 1942 by Barton Jones, M. Am. Soc. C.E., an engineer who was previously associated with the Tennessee Valley Authority. The project includes the installation of five generators of 25,000 kw each. The first two units are expected to cost approximately $4,000,000, and are expected to be completed by the end of 1945. Total power potential of the Santa River is estimated to be in excess of 500,000 kw. Recent discoveries of magnesium and known coal deposits add to the economic importance of this region.

In order to augment the electric power supply of the city of Lima, a new dam is being built at Autisha a few miles east of the city. This will increase the power generating capacity to 91,000 kw.

The Peruvian government has approved the construction of 11 small hydroelectric plants but work is retarded through lack of equipment. At the end of 1942 Peru had an estimated electric power capacity of 225,000 kw as compared to 212,000 at the close of 1940. Production of electric power in Peru has increased 37% since 1939, because of industrial growth.

BRAZIL ALSO PLANS MANY DEVELOPMENTS

Brazil has plans to harness the great Sao Francisco River with a series of dams and to exploit the agricultural and mineral resources—iron, gold, mica, bauxite, quartz, diamonds, and copper—of this valley of 260,000 sq miles.

The Sao Francisco River is 1,800 miles long and most of it is navigable through the stretches between the falls and rapids which are potential power sites. Just below the city of Itaparica, and 140 miles from the mouth of this river, the great Paulo Affonso Cataracts have a fall of 265 ft. Here a hydroelectric station is projected to develop 600,000 hp. Another falls just above Itaparica

C.I.A.A. Photo

RAILROADS OF BRAZIL HAVE BEEN FORCED TO BURN WOOD IN STEAM LOCOMOTIVES
Electrification, Which Is Planned, Will Eliminate This Necessity

is said to be capable of generating 200,000 hp. Higher up the river, near Joaeciro, is a third power site, and there is a fourth much higher, up near Pirapora. The American Technical Mission to Brazil has suggested a survey for the development of this river similar to the one used in developing the Tennessee Valley.

Brazil also plans to electrify more of its railroad mileage. Work has actually begun on the 90-mile section of the Sorocabana railroad which connects Sao Paulo, the industrial metropolis of Brazil, with the important city of San Antonio. This railroad, which is double-tracked through its entire length, is owned by the State of Sao Paulo. The electrification project will cost over $10,000,000 and is expected to take about three years to finish.

The line is meter gage, that is the rails are 39 in. apart as compared with $56^{1}/_{2}$ in. on United States railroads. The present rails are being replaced with heavier ones and the 80-ton locomotives now in use are to be replaced with 180-ton electric locomotives, said to be the heaviest ever built for meter-gage track. Ten of these locomotives have been ordered from the United States. For suburban service, trains of three coaches each will be used, and orders for these have been placed in the United States.

Brazil has abundant water power accessible to this line, which in the past has used imported coal and firewood. All available wood has been cut within several miles on each side of the line, and wood must now be hauled considerable distances. The Sorocabana Railroad has a total length of 1,316 miles, and serves the Pocos de Caldes region of southern Brazil, which is an important center for bauxite and other minerals. One branch of the line connects with the port of Santos. Brazil now has a total of 1,343 electric power installations of various types supplying light and power to 2,179 communities. In 1940 the installed capacity was 993,742 kw, of which 732,000 represented hydroelectric plants, and 193,140 steam plants. Nearly all the hydroelectric power at present produced is in the industrial states of Sao Paulo and Rio de Janeiro.

POWER SECONDARY TO IRRIGATION IN ARGENTINA

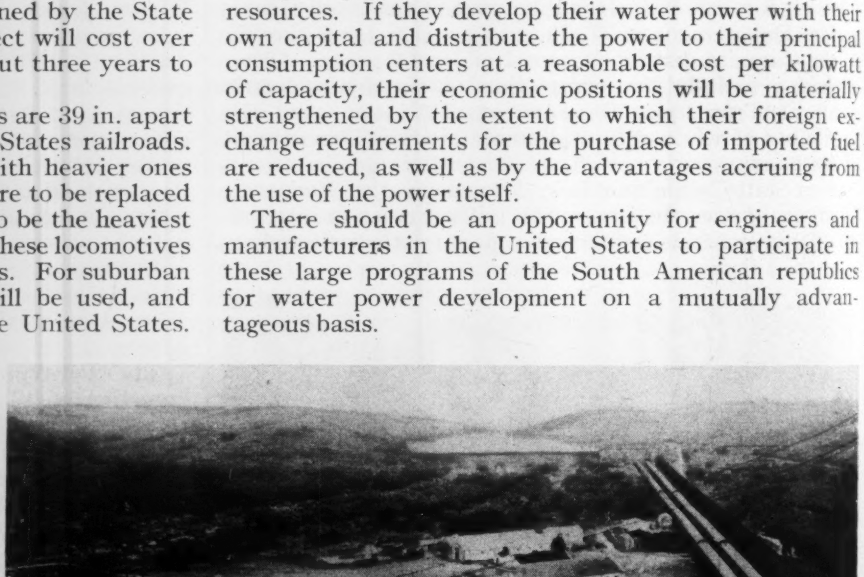
The Argentine Republic finds itself in a relatively disadvantageous position as far as the development of hydroelectric power is concerned. This is because the population and industry are both concentrated in the Atlantic seaboard area, in and around the province of Buenos Aires, while the water power sites are several hundred miles away in the foothills of the Andes. Argentina at present has 700,000 kw of installed electric power, of which 542,000 kw are in the province of Buenos Aires. The republic has only 31,000 kw of hydroelectric power, nearly all in the provinces of Mendoza, Cordova, and Tucuman.

As part of the national public works program, Argentina plans to build a number of irrigation projects impounding large lakes in the northern and western regions. Wherever possible, this water also will be used to produce electric power, although power is secondary to irrigation.

LOCAL OWNERSHIP DESIRED

A number of the South American countries have indicated that they wish to have their electric power facilities controlled by their own nationals. They desire foreign equipment and foreign technical assistance more than foreign capital in the development of their water power resources. If they develop their water power with their own capital and distribute the power to their principal consumption centers at a reasonable cost per kilowatt of capacity, their economic positions will be materially strengthened by the extent to which their foreign exchange requirements for the purchase of imported fuel are reduced, as well as by the advantages accruing from the use of the power itself.

There should be an opportunity for engineers and manufacturers in the United States to participate in these large programs of the South American republics for water power development on a mutually advantageous basis.



THE PARNAIBA POWER HOUSE AT SAO PAULO, BRAZIL
Storage Reservoir in Background

Cutting Plates for Welded Ship Construction

Use of Cams in Flame Cutter Provides Exact Dimensions Automatically and Avoids Use of Templates—from Paper Presented Before Structural Division at Los Angeles Convention

By Cyril P. Hubert

Chief Loftsman, California Shipbuilding Corporation, Terminal Island, Calif.

WITH the swing to all-welded ship fabrication, it became necessary to cut shell plates to exact dimensions so that excessive welding of ill-itting plates could be avoided. Hand cutting or machine utting using a template was too time-consuming.

In order to keep fully abreast of new developments, ohn A. McCone, vice-president of the California Shipuilding Corporation, inaugurated the policy of assemling his various departmental heads at a weekly buffet uncheon. Sufficient time was allotted for the discussion f new ideas that might be useful, and all concerned took way something specific of value in their work. Through his procedure attention was focused on an innovation in he annals of ship construction—that of plate-edge preparation by cam-cut action. As a result, an automatic late edger, guided by prepared cams, was developed.

The design of this machine was predicated upon prical shop and assembly practices. In order to prevent xcessive warpage caused by the heat absorbed by the hell plates when burning each edge to contour individully, it was found expedient to counteract the distortion ue to uneven cooling by flame cutting both sight edges imultaneously. Furthermore, perfectly matched square utt joints are an inseparable part of the problem of automatic welding. Well-matched joints result in an efficient eld, cost reduction, and less electrode metal required.

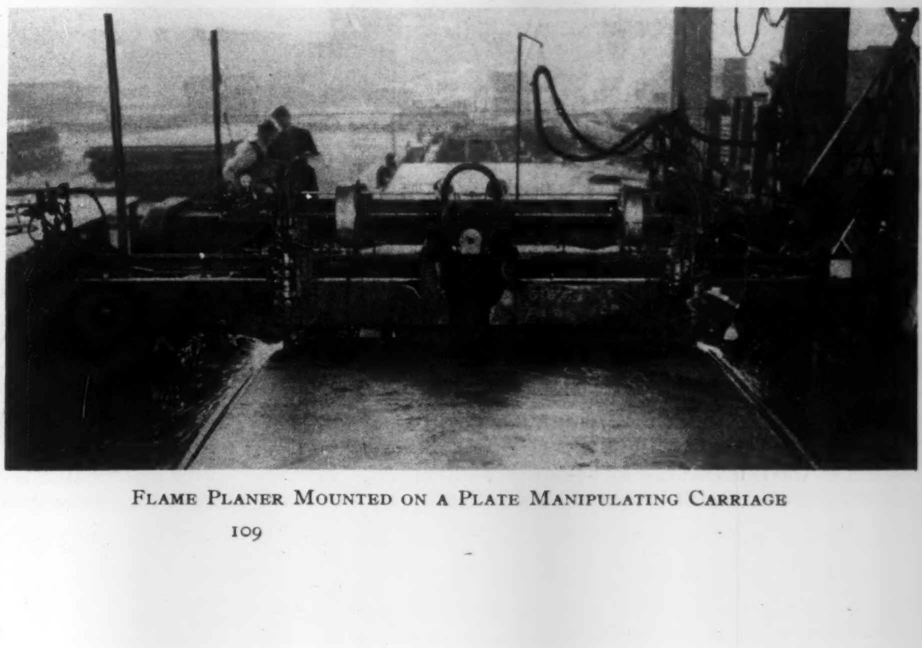
The feasibility of preparing plate edges by means of ully mechanized equipment capable of cutting shell lates to any shape or curvature was investigated and dopted, the work being accomplished by the utilization f cams in a flame planer. The Linde Air Products Company, in collaboration with the Engineering Department f the Link-Belt Company, Pacific Division, were intrumental in the development of this automatic platereparation machine, in which the oxy-acetylene process s utilized for flame cutting and beveling the edges of the teel plates preparatory to welding. This method of atack produced prepared plates, identical in shape to the emplate. It was then a simple matter to position the emplate for spotting rivet-hole pacing and alinement in accord ith pilot holes incorporated in the emplate.

The system consists essentially f three box-type gantry carriages. Two of these are transverse, each aving one flame-cutting assembly hat operates on a pair of guide ails and cuts transversely. The ain, or longitudinal, carriage has wo flame-cutting assemblies which an be adjusted to any desired idth for cutting longitudinal arallel edges. All three of the antry carriages have two pair of heels, V-wheels and flat wheels, hich operate on two parallel racks spaced 14 ft apart and exending 75 ft in length. The V-wheels are used to guide the carriages, while the flat wheels drive the assembly on the longitudinal tracks. Power is supplied by a small electric motor on the carriage. The plates are conveyed to proper cutting position by chain-driven rollers. Manipulators for lining up and squaring a plate before cutting are also provided. The cams which are mounted on the carriage enable the operator of the flame planer to duplicate each plate accurately without the use of templates.

HOW THE CAMS ARE MADE

In order to make cams for any particular shell plate, certain fundamental measurements must be taken accurately so that the cams will duplicate exactly the lines on the mold loft floor. The measurements necessary for this duplication can perhaps be best illustrated by referring to a typical analysis of any two successive plates, X and Y, in a particular strake (Fig. 1). A surveyor's transit is set up at the lower sight edge and centered directly over the point where the aft and forward butt intersects the lower sight edge. Then by taking a shot to the lower forward and aft ends of plates X and Y, respectively, the base lines are immediately established. The transit is then oriented with a shot taken to the upper intersection of the butt with the sight edge, thus determining the angle that the seam makes with the established base lines of the two successive plates. These angles are not only important for determining the slope of the end cuts, but also for determining accurately the forward and aft offsets, from which the relative starting position of each curve is secured. Then, when the angles and the measured slant widths of each end are known, the perpendicular width of the forward end can be calculated, thus giving the forward starting width of the flame.

For each shell plate, a separate pair of cams is made, one for the upper curve and one for the lower. For example, assume that cams are to be made for shell plate X, having a lower length of 30 ft, an upper length of 30



Flame Planer Mounted on a Plate Manipulating Carriage

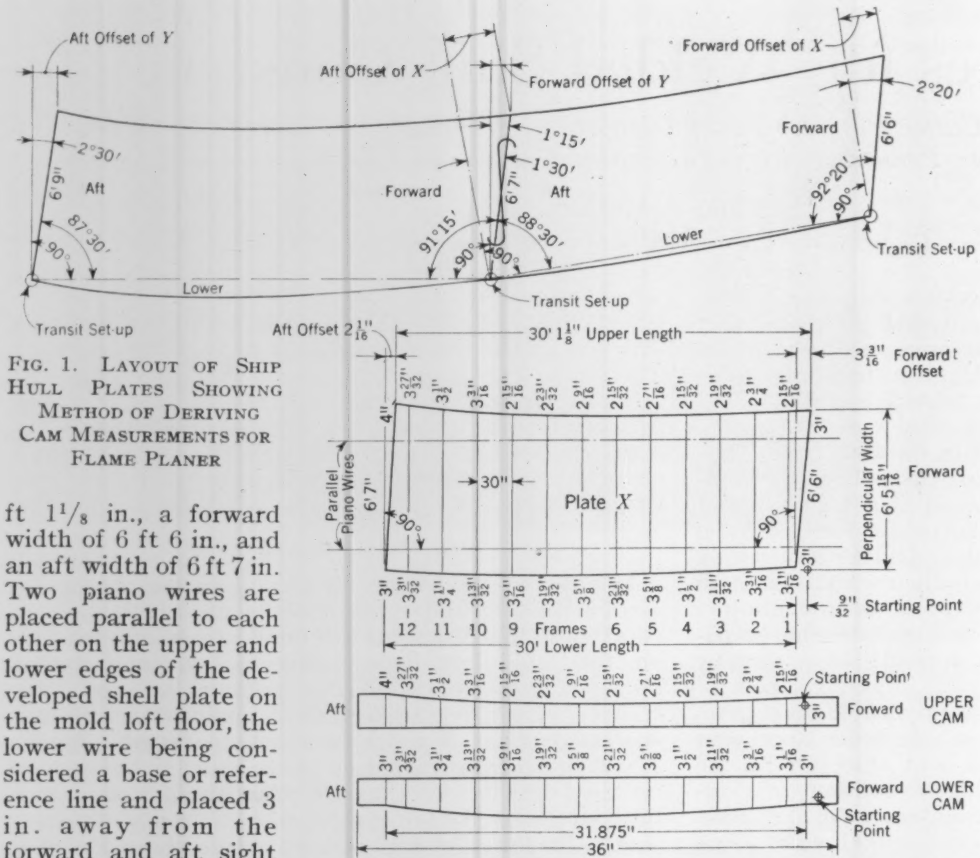

Aft Offset of Y
Aft Offset of X
Forward Offset of Y
Forward Offset of X
2°20′
2°30′
1°15′
1°30′
6′9″
Aft
Forward
6′7″
Aft
Forward
6′6″
92°20′
90°
87°30′
90°
91°15′
90°
90°
88°30′
Lower
Lower
Transit Set-up
Transit Set-up
Transit Set-up
Aft Offset 2 1/16″
30′ 1 1/8″ Upper Length
3 3/16″ Forward Offset
4″
3 27/32
3 1/2
3 3/16
2 15/16
2 23/32
2 9/16
2 15/32
2 7/16
2 15/32
2 19/32
2 3/4
2 15/16
3″
Parallel Piano Wires
6′7″
30″
Plate X
90°
90°
6′6″
Perpendicular Width 6′5 15/16″
Forward
3″
3 3/32
3 1/4
3 13/32
3 9/16
3 19/32
3 5/8
3 21/32
3 5/8
3 1/2
3 11/32
3 3/16
3 1/16
3″
9/32″ Starting Point
12 11 10 9 Frames 6 5 4 3 2 1
30′ Lower Length
Starting Point
Aft
Forward
UPPER CAM
Aft
Forward
LOWER CAM
Starting Point
31.875″
36″

FIG. 1. LAYOUT OF SHIP HULL PLATES SHOWING METHOD OF DERIVING CAM MEASUREMENTS FOR FLAME PLANER

ft $1^{1}/_{8}$ in., a forward width of 6 ft 6 in., and an aft width of 6 ft 7 in. Two piano wires are placed parallel to each other on the upper and lower edges of the developed shell plate on the mold loft floor, the lower wire being considered a base or reference line and placed 3 in. away from the forward and aft sight edges. Since the plate is 1 in. wider on the aft end, the upper piano wire is placed 4 in. away from the sight edge at that end, and 3 in. away at the forward end. Thus, the difference in end widths is taken care of in the upper cam, and the lower cam always starts at 3 in. and ends at 3 in.

Next the perpendicular distance between the wire and the sight edge at the molded line of each frame or rib is measured. These ordinates are then taken and plotted on a piece of light plywood, about 6 by 36 in. long. The frame lines are laid out on this wood, the points plotted, and a curve drawn in connecting these points. The pattern is then cut on the band saw and sanded smooth, with the result that this faired line exactly duplicates the curve on the floor. This curve is then transferred to a metal plate of the same size, scribed, cut, and filed smooth. Finally the metal plates are rolled so that they can be mounted on a pair of drums operating on a shaft placed on the gantry carriage.

By using a reduction gear box and a set of chains, the length of cams is cut down in the ratio of about 11 to 1; hence 1 in. on the plate equals 0.09 in. on the cam. This reduction is connected to a flat wheel on the side of the longitudinal carriage. Two cam followers are used to actuate the edge-preparation assemblies. These followers are in constant contact with the cam, and when the carriage moves forward the cams turn one turn to the full travel of 30 ft for the machine. Because of this great reduction (11 to 1), the resulting curves plotted on the cams are so condensed and powerful that the smallest irregularity of fairing of the lines on the loft floor is readily detected. The result is that the shell plates are cut extremely accurately, at twice the production rate that can be obtained by hand-operated cutting equipment.

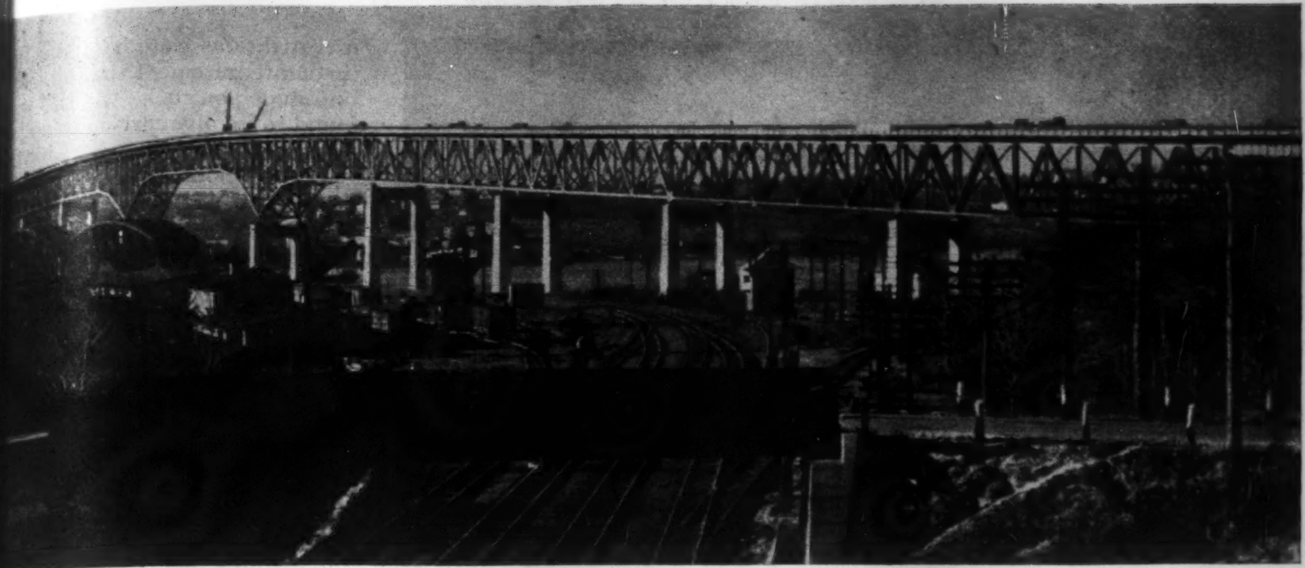
Since the upper and lower lengths as well as the forward and aft widths quite often are different, the ends are not necessarily parallel, and provision must be made for synchronizing curves properly. The upper and lower curves must start and maintain their proper relationship at all times. In the example just given, there was a forward offset of $3^{3}/_{16}$ in. Since the length has been condensed about 11 to 1, the upper curve must start $0.09 \times 3^{3}/_{16}$ in., or $^{9}/_{32}$ in., ahead of the lower curve. A small hole is drilled in each cam at the proper starting point. A bolt-like trigger instantly lines the cams in their correct synchronized position when the cut is started.

By means of an end cutting attachment mounted on the transverse carriage, the operator of the flame-planer machine can simultaneously cut the ends of the shell plates to the desired angle while the upper and lower surfaces are being cut by the cams. Therefore all four sides can be precision cut without the use of templates. This saves considerable time and also eliminates the irregularities of a template-cut plate.

Although shell plate X (Fig. 1) shows only a 1-in. difference in the forward and aft widths, the use of the cams is by no means limited to such small differentials. Plates with a 12-in. difference in end widths have been successfully cut by dividing this equally between the two cams.

It is not practical to make cams having more than a 6-in. rise because the resulting curve becomes too steep when rolled. This causes too much angularity between the cam followers and the cam surface, and tends to create a wedging action instead of a smooth actuation of the flame preparation assemblies. Hence many shell plates which are oddly shaped must be cut by template.

PREPARED CAMS STORED ADJACENT TO A FLAME PLANER



RAILROAD YARDS WERE CROSSED BY THE HIGHWAY BRIDGE
Railroad Bridge to the Left

High-Level Highway Bridge Spans Thames River

I. History and Preliminary Investigations of Connecticut Structure

By L. G. SUMNER, M. AM. SOC. C.E.
ENGINEER OF BRIDGES AND STRUCTURES, CONNECTICUT STATE HIGHWAY DEPARTMENT, HARTFORD, CONN.

ONE of the most formidable obstacles to east and west travel through Connecticut on the "shore route" is the Thames River. This tidal estuary extends inland 15 miles and is nearly a half mile wide for most of that distance. Existing crossings had long been inadequate for traffic volumes when the State Highway Department undertook to find a solution to the problem. The extent of the investigations and the location chosen for the high-level structure are discussed by Mr. Sumner in this article, first in a series on this bridge.

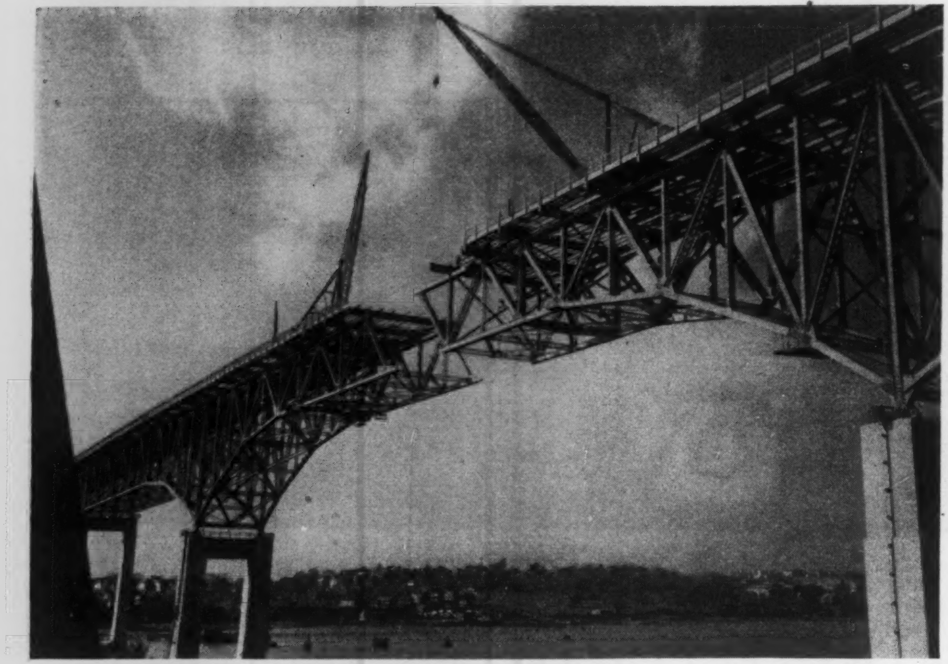
OBJECTIONS to facilities carrying highway traffic between New London and roton, Conn., across the Thames iver, applied to both the single ex- sting bridge and its approaches. his bridge, completed in 1889, had ormerly served a railroad and was onverted to highway use in 1919 to eplace the ferries formerly in use. pproaches were a simple connec- ion to the nearest available city treets, so the circuitous nature of he approach may be easily under- tood. The resulting access route n New London is not only extremely indirect, involving umerous right-angle turns, but was also located through he business section of the city so that bridge-bound ehicles were subject to considerable delay due to gen- ral traffic congestion in that area. Conditions at the roton end of the structure were somewhat better, but ere the intersection of Routes U.S. 1 and Conn. 12, a ew feet east of the end of the bridge, often caused nnoying tie-ups at times of peak traffic.

Thus the highway department engineers visualized the roper solution of the problem as a high-level bridge in a ew location, with approach roadways entirely inde- endent of nearby streets. In the summer of 1937, cting under legislative authorization, the highway de- artment undertook a detailed study for the purpose of etermining the proper location and probable cost of a ew bridge. An examination of the principal topo- raphic features of the area to be served indicated a solu- ion so obvious as to require but little elaboration. The main east-and-west highway is Route U.S. 1, the Boston Post Road. About five miles west of New London this route turns rather sharply to the southeast; then, as New London is approached, it turns again so as to enter the city from the southwest. No direct thoroughfare leads to the center of the city, but instead traffic follows the irregular street pattern of this old seaport.

East of the river, the usual route for eastbound traffic is still Route U.S. 1, which in this section is both hilly and indirect as it winds its way through the villages of Mystic and Stonington to the Rhode Island line at Westerly. At Groton an alternate but less apparent route to the east is available to the through traveler, Conn. 84, which runs farther inland and is superior in both alinement and grades to the better known U.S. 1.

It was plain that the proper location for the new Thames River highway bridge was along a line drawn from the point, to the west, where Route U.S. 1 begins to turn to the south and east, and running nearly due east, so as to connect smoothly with Route 84 in Groton. This line crossed all main north-south routes in the area, thus permitting interchange of traffic.

Two acceptable sites for the bridge were found, sufficiently different in location and character to embrace any possible advantage to be obtained from minor changes in location, and each capable of being connected to satisfactory approaches. The more northerly of the two locations selected for further study was suitable for a high-



CENTER SPAN OF NEW LONDON–GROTON BRIDGE NEARING COMPLETION

level structure because of the steeply rising, rocky banks on each side of the stream and a minimum amount of property damage. Its disadvantages were the width of the stream, in excess of 3,000 ft, and the increase in travel distance, for local traffic, over that for the southern location.

The southerly location, the one eventually selected for final design, is approximately parallel to, and about 200 ft upstream from, the old crossing. At this site, the width of the stream is less than at any other point of crossing, and a structure located here is more readily accessible to local traffic than at any other location where construction is practicable. However, the advantages of a short stream crossing were somewhat offset by the need to provide long viaduct approaches, and right-of-way costs were obviously higher at the lower crossing.

Following the completion of surveys, plans, and borings, preliminary designs were undertaken to develop the comparative possibilities of the two locations. Navigable stream requirements imposed by the War Department, and applying equally to both locations, are as follows:

For fixed bridges:	
Horizontal clearance	200 ft
Vertical clearance	135 ft*
For vertical-lift bridges:	
Horizontal clearance	150 ft
Vertical clearance, open	135 ft*
Vertical clearance, closed	35 ft*
For drawbridges:	
Horizontal clearance	150 ft
Vertical clearance	35 ft*

---

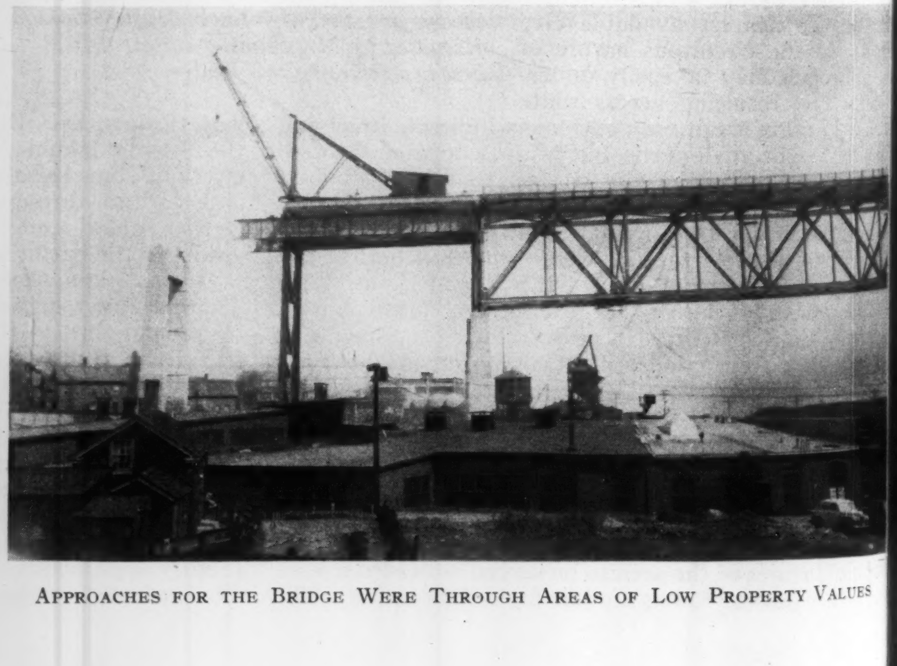
* Above mean high water.

Other design criteria included H-20 loading, dual-type, four-lane roadways with suitable sidewalks on bridge and approaches, and if possible, deck construction, the latter for esthetic reasons. First investigations were based on the further requirement that all piers be founded on rock. As this was found to involve carrying foundations to depths in excess of 150 ft, later plans were modified to call for the use of steel-bearing piles driven to the rock.

At the upper site, the topography practically eliminated the possibility of a low-level structure with a movable span. The lower site would permit such construction, but because of the long approach viaducts necessary to carry traffic over existing streets and railroads, the economies in first cost were less than might have been expected. When proper account was taken of operation and maintenance costs of the draw span, as well as of costs due to traffic delays, the low-level type was found to possess no advantages and it therefore received no further consideration.

Studies were made involving both cantilever and suspension types, including one monumental suspension structure having a main span of 2,400 ft, which was proposed for the upper crossing. At the lower site, conditions did not lend themselves so readily to the suspension type, and investigations were confined to the use of cantilevers for the main spans. Results of the preliminary investigations showed an advantage in physical cost of bridge and approaches of $500,000 in favor of the upper site, and placed the total cost of the project at $7,000,000 including right of way, removal of the old bridge, and the customary contingency allowance.

At this point a new element was injected into the problem by legislative enactment at the 1939 session in an attempt to arrange proper financing. The legislature created the Groton–New London Bridge Commission and instructed it to determine whether or not the construction of the bridge as a toll facility would produce a revenue sufficient to warrant the issuance of bonds to



APPROACHES FOR THE BRIDGE WERE THROUGH AREAS OF LOW PROPERTY VALUES finance construction. If the determination was favorable, they were authorized to issue such bonds in an amount not to exceed $8,500,000.

The most immediate and important result of this action was the making of a more thorough traffic analysis to supplement the simple vehicle count which had been held sufficient for previous investigations. These studies were made under the direction of the late Charles J. Bennett, M. Am. Soc. C.E., in cooperation with the planning survey section of the highway department. In addition to indicating an annual traffic of about 5,000,000 vehicles on the bridge, it showed that about 75% of this is local traffic and that a large part originates in, or is bound for, areas to the south of the old bridge.

Of immediate importance to the bridge location problem was the further finding that a bridge at the upper site, in comparison with present facilities, would involve 12,600 vehicle-miles per day in increased travel by users of the bridge, as opposed to an increase of 4,600 vehicle-miles for a bridge at the lower site. If three cents a vehicle-mile is taken as a fair value, the cost of the increased travel distance for the upper location over the lower amounts to $87,600 a year. This is a constantly recurring annual charge and, as the difference in first cost between the two sites studied was $500,000, this amount would be sufficient to equalize the two locations in less than six years. If capitalized at 4% it represents the sum of $2,200,000, a substantial part of which might properly be applied to offset the increased cost of the structure and approaches at the lower location. Thus a type of information formerly ignored and even today not always properly employed, served to reverse previous findings and to cause the adoption of the site adjacent to the railroad structure as the proper location for the new bridge.

Because of the proposed bond issue and toll-collection features, it was necessary to make certain additions and refinements to the plans and estimates previously prepared, also to determine what part of the project should properly be financed from bond-issue funds. In view of the established policy of the highway department in the matter of constructing bypasses and relief roads in urban areas, it was decided that such construction should properly be paid for from highway funds, especially as much of the traffic using these facilities would find its origin or destination in adjacent communities without crossing the bridge at all.

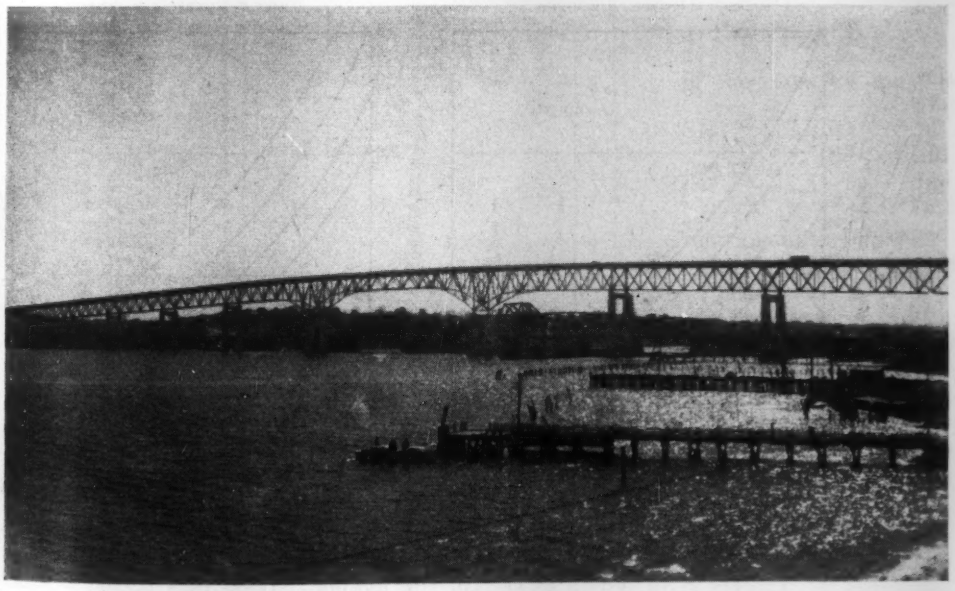
A review of the project on this basis provided the following cost estimate:

Highway Department funds:		
New London approaches	$1,042,400	
Groton	360,100	
Total		$1,402,500
Bond issue funds:		
Thames River Bridge	$3,750,000	
New London connections	167,000	
Groton connections	112,000	
Toll plaza	158,000	
Toll stations and facilities	68,000	
Lighting	35,000	
Total construction costs	$4,290,000	
Removal of old bridge	$ 100,000	
Right of way	610,000	
Interest during construction	300,000	
	$1,010,000	
Total without contingencies		$5,300,000

This estimate was submitted to the Bridge Commission, and by them compared with the results of the traffic and toll revenue studies which Mr. Bennett had completed. As these indicated an income from tolls that would justify a bond issue of $6,000,000, based on a 2% interest rate, the self-liquidating character of the project was satisfactorily demonstrated. The Commission readily obtained approval to a bond issue of $6,000,000, thereby providing a $700,000 fund to cover the cost of engineering and contingencies. Bids on these bonds were received in November 1940 with most satisfactory results, the average interest rate obtained being 1.4%. In this connection it should be explained that these are not revenue bonds dependent upon toll collection for payment of interest and principal, but are guaranteed by the full faith and credit of the State of Connecticut. This accounts for the very favorable interest rate obtained.

With funds necessary to construction thus assured, the project entered its last phase preliminary to the receipt of bids, and the completion of final design, contract drawings, and specifications. A description of this phase of the work is to form the basis of a later article.

Engineering work on this phase of the project, with the exception of traffic and toll revenue studies, was carried out by the staff of the Connecticut State Highway Department, William J. Cox, Commissioner, A. W. Bushell, Deputy Commissioner (at that time Director of Engineering Construction), and the writer as Engineer of Bridges and Structures, being principally concerned with the various features of the problem. The work of bridge design and estimating was directed by William G. Grove, at that time Associate Engineer with the Department, now serving with the U.S. Engineer Corps. All are Members of the Society.



New Highway Bridge Provides a High-Level Crossing of the Thames River

Engineers' Notebook

Ingenious Suggestions and Practical Data Useful in the Solution of a Variety of Engineering Problems

Secondary Stresses in Bridge Members Due to Their Own Weight

By W. E. HANSON

ENSIGN, U.S.N.R.; FORMERLY INSTRUCTOR, GENERAL ENGINEERING DRAWING, UNIVERSITY OF ILLINOIS, URBANA, ILL.

THE chord and diagonal members of a bridge truss are usually proportioned from a calculated combination of tension or compression without considering the stress in the member due to its own weight. Secondary stresses due to distortions of the truss under loads are not usually considered if the depth of the member is less than one-tenth of its length. On the other hand, if this depth-to-length ratio is greatly decreased, it may be entirely possible that the stress due to the member's own weight should be considered.

A method is here given for finding the stress resulting from the weight of a tension member in terms of its length, radius of gyration, and depth. Although this is developed for a tension member in which the moment of inertia of a net section must be considered, it can be shown that Eq. 4 may be applied to compression members also. The increase in stress in a compression member due to deflection will very rarely exceed that increase in a tension member due to reduction in moment of inertia for a net section.

The bending moment in the member due to its own weight will be

$$M = \frac{wL^2}{q} \quad \ldots\ldots\ldots (1)$$

where
w = weight per foot of member
L = length of member in feet
q = a factor dependent upon end restraints and distortion of truss under loads

Evaluation of q for any particular member would involve an extensive investigation of joint rotation at each end of the member. If the joints at each end so rotate that restraints are removed, $q = 8$, and the bending stress in the member due to its own weight (s_w) will be

$$s_w = \frac{Mc}{I}, \text{ or } s_w = \frac{12wL^2}{8} \times \frac{d}{2I} \quad \ldots (2)$$

where d = depth of member in inches, and I = its moment of inertia. The weight per foot may be written in terms of the cross-sectional area, A, if a factor of 1.1 is introduced to care for added weight of details. The moment of inertia may be written in terms of A and the radius of gyration, r, if the net section is considered. Then $w = 1.1 \times 3.4\,A = 3.74\,A$, and $I = 0.86 \times Ar^2$ (approximate). Substituting these values in Eq. 2,

$$s_w = \frac{3.26L^2d}{r^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

The radius of gyration, r, is some function of d which can be closely approximated (or calculated) for any particular shape of cross section. Substituting $r = kd$ in Eq. 3,

$$s_w = \frac{3.26L^2}{k^2d} \quad \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

It is probable that only in long members will any design consideration need to be given to secondary stresses due to the member's own weight. Consequently, the

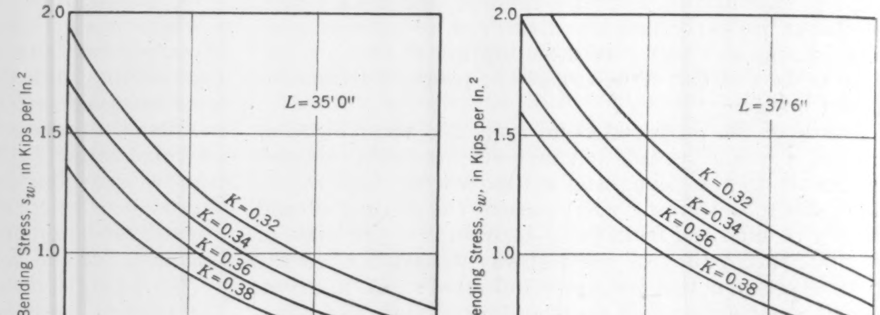


FIG. 1. CURVES FROM WHICH TO OBTAIN THE BENDING STRESS IN A MEMBER CAUSED BY ITS OWN WEIGHT

curves in Fig. 1 have been drawn for relatively long lengths. For any given value of the radius of gyration and the depth of the member, the bending stress may be obtained. The curves may also be used to find the minimum depth required if some maximum value of s_w is specified. This minimum depth to avoid excessive bending stress due to the weight of the member will give the designer a suitable range of depths if one-tenth of the length is considered the maximum to avoid excessive secondary stresses due to distortion.

Nomographic Chart for Flow in Pipes Partly Full

By H. M. GIFFT, ASSOC. M. AM. SOC. C.E.

ASSISTANT PROFESSOR OF CIVIL ENGINEERING, CORNELL UNIVERSITY, ITHACA, N.Y.

SOLVING design problems for open-channel flow often requires investigation of velocities and depths for different rates of discharge. To reduce the amount of computation, diagrams have been devised for use in conjunction with the usual charts or diagrams for conduits flowing full. In some cases, such as in the design of combined sewers, both the maximum rate of discharge and the velocity of flow at minimum discharge are controlling factors. Also, as in the design of outlet works for a dam, it may be necessary to provide for a certain velocity and rate of discharge in a conduit of predetermined dimensions based on other considerations. Except for special circumstances, a cut-and-try method is ordinarily followed, using two or more diagrams for solution.

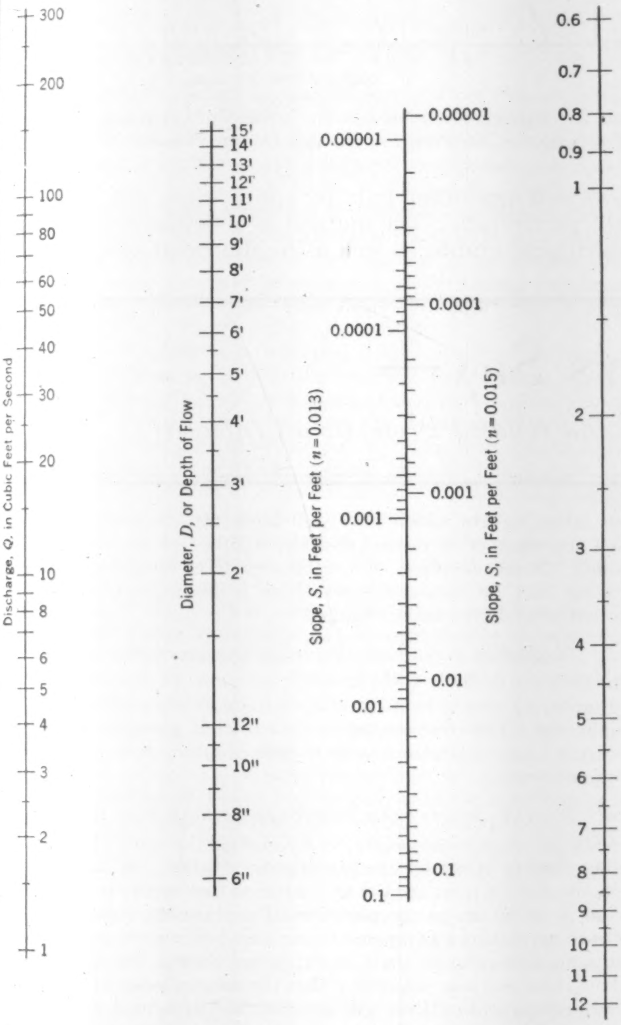


FIG. 1. ALINEMENT CHART EVOLVED FROM MANNING'S FORMULA

Considering that any discharge calculation is limited to the accuracy of the formula used and its applicability to existing conditions, the writer has devised an approximate solution which is not only very simple but yields surprisingly accurate results. An ordinary alinement chart was evolved from Manning's formula (Fig. 1) but any comparable formula would give equally good results.

Theoretically, when a pipe is flowing half full, the velocity V is equal to the velocity when flowing full, V_F, and the discharge Q is half of the full discharge Q_F. A line on the chart between $Q_F/2$ and V_F would also represent the discharge q, the diameter d, the slope s, and the velocity v of a hypothetical pipe flowing full and having a slope of 1.59 times the slope S of the pipe being considered.

From $V = \frac{1.486}{n} R^{2/3} S^{1/2}$ and $Q = AV$, eliminating R and A, we get $Q = 3.83 \frac{n^3 V^4}{S^{3/2}}$, from which we may write $\frac{q}{Q_F} = \left(\frac{v}{V_F}\right)^4 \left(\frac{S}{s}\right)^{3/2}$. Since $s = 1.59S$, then $\frac{q}{Q_F} = 0.50 \left(\frac{v}{V_F}\right)^4$. This equation, together with the computed relationship between partially full flows and corresponding velocities, is plotted in Fig. 2. Since the two curves are very close, the corresponding Q and V of the pipe flowing partly full at various depths would be practically equal to the q and v of a series of hypothetical pipes flowing full, and of $s = 1.59S$.

Also from $V = \frac{1.486}{n} R^{2/3} S^{1/2}$ and $Q = AV$, eliminating V and expressing R and A in terms of the diameter, D, of the pipe, we may write $Q = 340nD^{8/3}S^{1/2}$. Then $\frac{q}{Q_F} = \left(\frac{d}{D}\right)^{8/3} \left(\frac{s}{S}\right)^{1/2}$ and, since $s = 1.59S$, $\frac{q}{Q_F} = 1.26 \left(\frac{d}{D}\right)^{8/3}$. This equation, together with the computed relationships between partial flows and corresponding depths, was also plotted in Fig. 2. Over the range of values from $q = 0.1Q_F$ to $q = 0.9Q_F$, the d of the series of pipes flowing full is approximately $0.2D$ greater than the actual depth of the flow in the partly full pipe. Therefore, within these limits, approximate depths of flow can be determined by subtracting $0.2D$ from the indicated d of the hypothetical pipe. Three examples of the application of these equations follow.

Example 1. $D = 2.5$ ft, $n = 0.013$, $S = 0.0006$, $Q = 2.0$ cu ft per sec. To determine V and depth of flow.

A straightedge between $D = 2.5$ and $S = 0.0006$ indicates that $Q_F = 10.0$ and $V_F = 2.05$. A line from $Q_F/2 = 5.0$ to $V_F = 2.05$ intersects the slope line at $s = 0.00095$. Pivoting the straightedge about $s = 0.00095$

to $Q = 2.0$, then $V = 1.65$. The depth of flow is $0.2D$ less than the intercept of 1.25 on the diameter scale. Depth $= 1.25 - 0.50 = 0.75$. Using the same pivot point, other corresponding values of Q, V, and depth of flow can be obtained.

Example 2. $Q_F = 14$ cu ft per sec, $n = 0.013$, $Q_{\text{min.}} = 2.1$ cu ft per sec. To determine D and minimum S, such that $V = 1.5$ ft per sec at minimum flow.

A straightedge between $Q = 2.1$ and $V = 1.5$ intersects the slope line at $s = 0.0007$. Pivoting about this point to $Q_F/2 = 7.0$, then $V_F = 2.05$. The straightedge lined between this $V_F = 2.05$ and $Q_F = 14.0$ yields $D = 3.0$ and $S = 0.00047$.

Example 3. $D = 6.0$ ft, $n = 0.013$, $Q = 250$ cu ft per sec, $V = 12$ ft per sec. To determine slope.

The straightedge between $Q = 250$ and $V = 12$ intersects the slope line at $s = 0.0075$. Pivoting about this point to $d = \left(\frac{D}{2} + 0.2D\right) = 4.2$ on the diameter scale, then $q = 150 = Q_F/2$ and $v = 10.5 = V_F$. Finally pivoting about $V_F = 10.5$ to $Q_F = 2 \times 150 = 300$, $D = 6.0$ (as given) and $S = 0.0046$.

Slightly different results will be obtained by using the usual diagrams expressing the hydraulic elements in terms of the corresponding depth of flow. Considering the inaccuracies connected with the use of the open-channel flow formula itself, these discrepancies are of no practical significance.

Similar charts can be constructed for other than circular sections by providing double scales for velocity and depth, one pair of V and D scales to apply for full flows and the other pair to apply when the section is only partly full. The method is of course applicable to logarithmic graphs as well as to alinement charts.

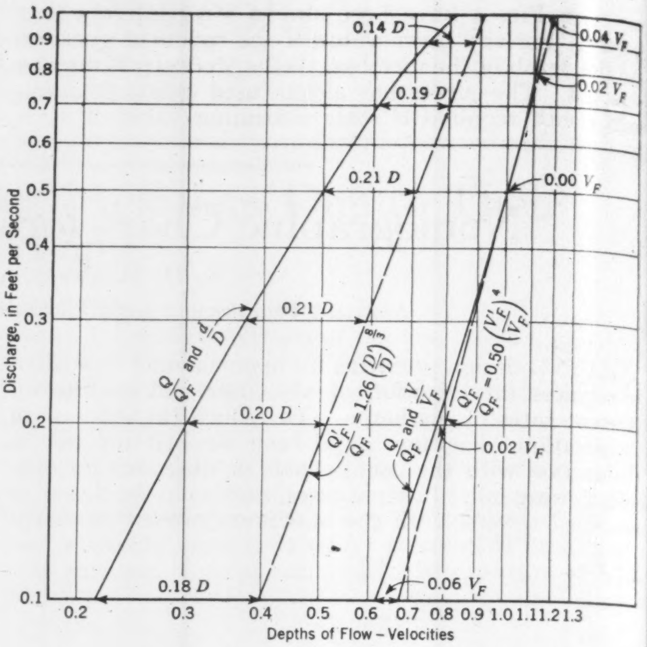


FIG. 2. EQUATIONS PLOTTED TO SHOW RELATIONSHIP BETWEEN PARTIALLY FULL PIPE FLOWS AND CORRESPONDING VELOCITIES

Our Readers Say—

In Comment on Papers, Society Affairs, and Related Professional Interests

The Local Section and Collective Bargaining

TO THE EDITOR: In the January issue of the Philadelphia Section "News," I undertook to answer a few questions that seemed to me of interest to the Section in connection with the adoption by the Board of Direction of the Society of the report of the Committee on Employment Conditions. Since the Local Sections are to play a part in the establishment of bargaining agencies, members in other Sections may also be interested in some of the questions that have come up in our Section.

1. *How will a bargaining agency be established?*

Before the Local Section can sponsor a "bargaining agency," it is necessary that its constitution be amended. Only those members of the Section who are subscribing members are eligible to vote. If you believe in this new activity of the Society, you will want to join to support the movement. If you do not approve, you will want to qualify as a voter to register your opposition.

2. *Is collective bargaining here to stay?*

This statement of the Committee on Employment Conditions that collective bargaining is here to stay has been questioned. Notwithstanding many mistakes of policy and tactics by the labor leaders, there has been in the United States a steady growth in union membership; and in spite of the fact that many unions are making the front page by ill-advised strikes, there are hundreds of plants where unions and management are cooperating to the advantage of both employer and employee. There is no indication that the clock can be turned back. There are many signs that healthy restrictions will soon be placed on the actions of unscrupulous labor leaders which may well have the effect of increasing both the number of unions and the number of members in the unions. Some members of the Society have suggested that the Wagner Act be amended, but there is no indication that the present labor laws can be changed.

3. *Is collective bargaining ill-advised because employers as well as employees are members of the Society?*

Employers should be as interested in good labor relations as are employees. The competition in the future is going to be between industries, and capital and labor in each industry must cooperate or both will lose.

4. *Must the Society either join or oppose the A.F. of L. and/or the C.I.O.?*

The Society is not opposed to organized labor. It has no battle with the A.F. of L. or the C.I.O. All that the Society is attempting to do is to secure to the professional engineering employees their right to bargain as a group and to have as their representative someone who understands their working conditions. If no action is taken, there is a real possibility that the subprofessional group with a subprofessional outlook will become the bargaining agent of the professional engineer.

5. *Is it beneath the dignity of professional men to indulge in collective bargaining?*

The inherent difference between the professional men and others is that the professional man undertakes to serve society—he shares each advance with the entire group—so that all persons may benefit by any new knowledge. Thoughtful people are agreed that one of the most difficult questions that this country will face at the end of the war is the relation between management and labor. There is no group as well fitted to bridge the gap between the employer and the employee as the engineer. He understands the problems of both, he is accustomed to assuming the position of interpreter between the two groups, and it would seem that he has a special obligation at this time to make his contribution by aiding in the settlement of this difficult problem. How can he better approach this problem than by attempting to solve it for his own group and solve it in a way that will result not only in the protection of the younger men of the profession, but in a way that will make a real contribution to the entire movement?

In conclusion, the writer believes that there is only one thing that may cause this effort to fail, and that is the indifference of our own members. Opposition is not to be feared because opposition will merely bring up points that should be made more clear. Indifference is fatal. If each member takes a positive position upon this movement of the Society, then there will be no question but that the action of the Board of Direction at Atlanta in October will become a milestone in the progress of the Society.

Scott B. Lilly, M. Am. Soc. C.E.
Director, District No. 4

Philadelphia, Pa.

Labor and Economics

To the Editor: The American Society of Civil Engineers has taken steps toward "unionizing" the members of the profession. This might be desirable under other circumstances, but just now when organized labor has attained such political power that it can force the payment of wages in excess of the value of production, and has forced the nation to go over 20 billion dollars into debt in 10 years, the Society should not be associated with that kind of bargaining. The whole business of the engineer is to produce the most wealth with the least labor, and organized labor has been forcing the payment of higher wages for restricted production ever since 1932.

When prices dropped back to normal in 1930, the buying power of union wages became more than double their 1914 buying power, and the unions had such political power that their wages in dollars have not been lowered since. In 1934 the dollar was depreciated by fixing the price of gold at $35 an ounce. This restored the buying power of gold and the foreign market, but not that of fixed incomes, bonds, or incomes of endowed institutions at a time when buying power was needed most to employ labor.

Because the spending of borrowed money affords temporary prosperity, a majority of the people now believe that the more money spent by the Federal Government the greater the prosperity, and many of the postwar plans provide for continued spending. The Fair Labor Standards Act is an example of how the leaders of the nation have deceived the people. It was enacted by Congress as a cure for unemployment and to increase prosperity, when actually it has done and will do just the opposite.

It is not the money paid in wages that causes prosperity; it is the goods and services produced, and the more produced in exchange for the money, the greater the prosperity. If prosperity were only a matter of wages and employment for everyone, we could continue making munitions after the war, load them in ships, and sink them at sea. This is no more preposterous than "featherbedding" on the railroads, ship stewards to limit production, liberal pensions to induce people not to earn money, and the tariff to increase costs. There may be an overproduction of food, but never of labor-saving devices and luxuries. Each person exchanges his production for money, but that money can buy only what the others have produced.

Labor has been fighting against the use of labor-saving devices for two hundred years, because wage earners fail to understand that the more they produce the more they can be paid. It is the business of the engineer to produce the most wealth with the least expenditure of labor, because that is the only way prosperity can be attained. The truth is that everyone who is not supported by charity or taxes is a producer of wealth and is both an employer and a wage earner. The wage earner employs his employer to manage the business and sell the production; he employs the farmer to feed him, the merchant to clothe him, and the capitalist to provide the tools and power. If any of these stop producing, the standard of living of all will be lower. The only man who is not an employer and a wage earner is one who provides every item of his needs for himself, as a man would have to do if he were the only inhabitant of an island. In that situation, he must earn his living or die; that is the law of nature. If there are two men on the island in question and one works only long enough to produce what he himself consumes, the standard of living of both will be lower than if both work full time at the jobs at which they are most proficient.

The Wagner, Fair Labor Standards, and Railway Mediation Acts all limit the freedom of the people to produce as much wealth as possible, working as many hours a week as they are willing to, and should be repealed. The more produced, the greater the prosperity.

Arthur B. Foote, M. Am. Soc. C.E.
Consulting Mining Engineer

Grass Valley, Calif.

Additional Comments on Collective Bargaining

Dear Sir: Concerning the collective bargaining policy of the American Society of Civil Engineers, I have read with great interest the objections raised by Messrs. W. W. Crosby and E. H. Cameron, published in the January issue. As one who has met these real problems face to face, let me discuss the other side of the picture.

There are many of us holding membership in the Society who work in great industrial plants and on construction projects throughout America in connection with the war effort—in my own case, the construction of a hundred-million-dollar aviation gasoline refinery. Almost without exception, these jobs are organized under labor unions, and organized labor dictates the policies to be followed.

The engineer is an integral part of these large organizations. He works side by side, day after day, on the same work with the various crafts. The crafts are organized, and the engineer is unorganized, which is entirely satisfactory to the engineer. However, the engineer must have helpers—technicians, rodmen, and all kinds of assistants. These assistants see the advantages of organization, realize that they are not enjoying the privileges of organized labor, and, worst of all, that their pay rate is much lower, in proportion, than that of union men. The result is that they attempt to organize and, at the same time, include the engineer in their organization and seek to represent him in their collective bargaining.

I do not say these things because I have read them somewhere. I am now engaged on my fourth defense project of major size, and I have grappled with such problems for more than three years. When some of my associates and I were first confronted with the problem of joining a labor union or resigning our positions, we appealed to the Society for advice and help. We felt that this was the proper place to go. I am happy to report that we were not turned away. The Society responded with courage and vigor, and rendered real aid when we needed it most. As a result of the cooperation given us, the Society won many friends in this area. In fact, when Mr. Peckworth, of the Society's staff, came to Lake Charles (La.), more than fifty engineers gathered to hear him speak.

No one desires more than I to see the engineering profession maintained on the highest possible level. Advancement and improvement as one of the learned professions must ever be our watchword, but we cannot afford to allow the control of engineering affairs to pass from the engineer and his own organizations into the hands of outside groups. There is no middle course. The engineer cannot bargain collectively unless he is backed up by a national organization which is willing to face every problem that affects his profession.

The Society is not attempting to force upon its membership some new idea that was contrived in some far-off place, but rather is lending real help to a large percentage of its membership who are confronted with the problem of what to do under present working conditions. One thing is certain—if the Society does not gain and maintain control of the bargaining rights of the civil engineer, whenever these rights come into jeopardy, then large groups will automatically be drawn away into other associations outside the control of the civil engineer, and the Society itself will devolve into an organization for executives who enjoy the privilege of being at the top of the profession.

WILLIAM WESLEY TURNER, Assoc. M. Am. Soc. C.E.
Lake Charles, La.

Differentiating "Footing" and "Foundation"

DEAR SIR: The writer is suggesting that the functional significance of the terms "footing" and "foundation" be duly appraised, and established in standard nomenclature to the end that when the terms are used in writing or planning there will be no question as to what is referred to. Having this question in mind, a rather limited review of existing writings, including scientific encyclopedias, will bring out, it is believed, a gross lack of differentiation which the writer feels represents a deficiency in technical clarity that should be corrected.

In one case it was requested that a report be made of the foundation of a structure. The report as rendered contained an accurate appraisal of the footing and piers of the structure, while what was really desired was intimate and adequate subsurface data regarding the stratum, or strata, on which the structure was founded. There are many occasions when the identity of footing data and foundation data is very carelessly indicated on plans and in specifications, causing uncertainty and confusion which proper terminology would eliminate.

It is submitted that a structure may be built without the use of footings, by means of walls, piers, or columns, but it cannot be constructed without being founded on a foundation. We design various types of footings, such as pile footings, spread footings, piers, caissons, etc., for the purpose of distributing loads to the foundation. This is a definite function of an element of a structure, and it is felt that it should be clearly identified.

The separate and distinct consideration required for diagnosing and evaluating the stratum or strata upon which a structure is to be founded, in order to determine the adequate and economical type of footings to be used, is assuredly a definite procedure and should be so recognized. It is suggested that the identification of a footing be "that element of a structure which provides the means of stabilizing and distributing to the foundation, the loads imposed thereon," and that the foundation be identified as "the existing stratum or strata on which the structure is to be founded or built."

This suggestion is made in the sincere belief that clarification through definite identification of the terms "footing" and "foundation" will prove beneficial.

WALTER S. FRICK
Assistant Chief, Military Construction Branch, Engineering and Development Division, Office of the Chief of Engineers, War Department
Washington, D.C.

Modern Trend Toward Socialization of Civil Engineering

DEAR SIR: Whether we like it or not, there has been a trend toward a socialization of civil engineering in the past three decades so strong that education and professional societies in this field will need to take it into consideration. This trend accounts largely for the diminished attractiveness of a career in this old and honorable calling, manifested by diminished enrolments in civil engineering curricula. It first rose to the surface and became visible in the licensure laws. It has, in general, grown out of state and federal highway programs, national reclamation projects, river control developments, regional planning by federal authorities, and other government enterprises. It has followed the usual pattern—namely, government regulation turning into government management.

Civil engineering inherently relates to public works. And as public works have passed from corporate development under railroads, utilities, drainage, and irrigation to public control and ownership, civil engineering, following the flag of public works, has become a function of government almost as much as is military engineering. This is a situation which largely prevailed in Germany and France in prewar times and perhaps represents a fairly normal development. Civil engineering has become virtually civic engineering.

Two indications of future direction seem to be deducible from these premises. In the first place, civil engineering education must recognize the fact that familiarity with political organization and procedures is an essential part of professional preparation and should be so contemplated in the curriculum. This observation does not refer to a study of political theory in general so much as it does to public-works administration in particular—their financing and execution, and their social significance over a period of generations. A very considerable fraction of federal, state, county, and municipal budgets concerns matters lying within the ambit of the civil engineer.

The second point at which socialized control touches the profession is in the relation of the societies to their individual members. Whereas the products of other branches of engineering are marketed to individuals, civil engineering must be sold to the public, directly at times and through its representatives in typical cases. Procedures in such collective salesmanship should be developed. Whereas discarded automobiles and other engineering products wastefully litter the landscape after short individual ownership, public works—the fruits of civil engineering—serve the need of the community through successive generations and represent a high attainment in conservation. The private benefits of community wealth in public works are less obvious and harder to impress on the consciousness of the individual than in the case of products personally owned and enjoyed. "Keeping up with the Joneses" is not a pertinent selling argument. Gratification of egoistic desire for sole possession is not an incentive. Trade union ideologies are not germane. The public must be educated to the individual values, humanistic as well as economic, of things possessed and enjoyed in common. This is a goal to which the professional societies might well address their efforts.

C. C. WILLIAMS, M. Am. Soc. C.E.
President, Lehigh University
Bethlehem, Pa.

Satisfactory Benchmarks Attached to Growing Trees

TO THE EDITOR: In Dr. Terzaghi's article, "Recording Results of Field Tests on Soils," in the December issue of CIVIL ENGINEERING, he deprecates the laxity often found in recording field observations and states: "In one instance, in connection with settlement observations in the outskirts of a large city, it was discovered after many inquiries that the principal benchmark was attached to the trunk of a large, growing tree."

It is a matter of common knowledge that trees increase in height by extending the trunk and branches above and not by pushing themselves up out of the ground. Many instances have come to my attention where completely satisfactory benchmarks have been established by driving railroad spikes horizontally into the trunks of large growing trees.

JOSEPH J. BERNSTEIN, Assoc. M. Am. Soc. C.E.
Major, Corps of Engineers, U.S. Army
Niagara Falls, N.Y.

Design of California Bridges

TO THE EDITOR: In his article, "Welding to Ensure Composite Beam Action," in the January issue, Mr. Enke states that "Both bridges were designed by the writer and built under unit-price contracts for the California Division of Highways in 1941."

It should be emphasized that the bridges were designed and built by Mr. Enke when he was one of the designers in the Bridge Department of the California State Division of Highways, and neither designed nor built by the Morrison-Knudsen Company, of which he is now design engineer. All state highway bridges in California are designed by the State Division of Highways.

F. W. Panhorst, M. Am. Soc. C.E.
Bridge Engineer, California
Division of Highways

Sacramento, Calif.

Forum on Professional Relations

Conducted Column of Hypothetical Qestions with Answers by Dr. Mead

In the current issue Dr. Mead gives his answer to Problem No. 18, which was announced in the January issue. The problem states that "A municipal board which had no capable engineer in its employ hired a firm of consulting engineers to prepare designs, receive bids, and recommend the award for a bridge. The engineer of the company, who received the contract on a pound basis, prepared an alternate plan for a structure of better appearance, of equal strength, and fully in accord with the specifications but 8% less in weight. The bridge company's engineer submitted his alternate plan to the consulting firm who turned it down as being likely to injure their reputation, and the alternate design was buried in their files. What else could the fabricating company's engineer do?

"Was the submission of an alternate design of the bridge by the contractor's engineer, after bids had been taken, the proper procedure for the contractor? If so, should the engineer of the bridge company make further attempts to secure the adoption of what he considers a more satisfactory and economical design?"

Most consulting engineers in general practice have such a broad practice that they seldom are experts in any particular line. In such cases it is a questionable procedure for them to prepare detail designs for a bridge. It would seem safer and more economical as a rule if they were to prepare specifications, giving span, loading, and so forth, and ask for designs to be furnished by the bridge companies under competitive bids.

In such cases it is necessary to examine carefully each plan that appears fairly competitive, and to compare it with the lowest bid in order to determine the safety factor and availability. When such plans are furnished by the consulting engineers, any reliable bridge company would probably want to check them—for safety at least—before undertaking the construction, unless the consultants are recognized experts. If the plans are found safe but uneconomical, it may be considered a generous action on the part of the bridge company to submit improved plans to the consulting engineers for their consideration. This, however, is as far as the engineer of the bridge company should go.

If the plans are found safe but uneconomical by the consulting engineers, it would seem only fair that the client be consulted as to his wishes in the matter and to make the survey for him if such saving will result in a suitable, safe structure.

It seems unfortunate that clients who seldom have occasion to employ engineers who are specialists are likely to secure assistants who are not qualified to secure the best and most economical results under such conditions. If the bridge as designed is safe, the engineer of the bridge company should not go over the heads of the consulting engineers to the client with the consultant's proposed plans but should build the structure as originally planned. The bridge company should not build an unsafe structure as it cannot afford to spoil its reputation for good work or risk the lives of the public by building an improper structure.

I should like to quote two letters that I have received in answer to this problem. Carl Torrence, Jun. Am. Soc. C.E., of Richmond, Va., writes: 'From my experience with a fabricating concern, I would answer Problem No. 18 as follows:

"The contractor should not have prepared an alternate design. He is not a professional engineer and was not commissioned by the owner to perform an engineering service. His contract with the owner was to fabricate the bridge according to the engineer's design. Time is a factor in construction jobs, and as soon as the contract was awarded the contractor should have devoted his attention to shop details and mill orders, instead of delaying the work to prepare an alternate design. The contractor should make no further attempt to secure the adoption of his design since that would be contrary to Rule 5 of the Society's Code of Ethics."

Excerpts from a more detailed letter—by Frank W. Chappell, M. Am. Soc. C.E., of Dallas, Tex.—follow:

"The contractor acted ethically in presenting his ideas to the engineer, rather than to the owner. However, it is not clear why the contractor should incur the expense of a redesign. The usual reason is that he believes he can make more money by the change, since his alternate proposal is non-competitive.

"The problem, as stated, grants that the redesign provides 'for a structure of better appearance, of equal strength, and fully in accord with the specifications.' This is the crux of the whole problem. It is suggested that appearance is a matter of opinion, and opinions differ. What authority stated that the redesign gave a structure of better appearance? Commonly this can be determined only by a competent jury of engineers, architects, and artists, and no such determination is provided by the problem. Equal strength and full compliance with specifications are, likewise, taken for granted. Certification of equality and compliance could be made only by a competent and disinterested engineer, after a thorough check. Such check is not provided for in the statement of the problem, and it is presumed that none was made. Is it intended that the statement of the contractor be accepted at face value? If not, who evaluated the redesign as the equal of the original? The problem suggests a condition that does not exist in the average case, and makes the engineer guilty of inadequately safeguarding the interests of his client without showing proof that he was so guilty.

"Long experience with 'redesigning,' both as the designing and the redesigning engineer, has convinced the writer that the practice is pernicious and not in the interest of owners or the general public. In general, if a structure has been designed in accordance with a recognized code, ordnance, or practice, it cannot be redesigned to comply with the same requirements at sufficient saving in cost to pay for a new set of plans. Competitive designing exposes the designer to the temptation to 'skin' the job, cutting corners here and there in small details, but aggregating considerable saving in quantities. The original designer could do the same if he were willing.

"If a consulting engineer does not keep up with the progress within his profession, he should be passed by for more alert men. The same comment applies to the medical, dental, and legal professions. But it is the function of the patrons of these professions, and not of the suppliers of materials, to weed out the incompetents. It is easy for irresponsible persons to take long chances with the lives and property of other people for private gain. Progress in such essential arts as bridge design must be slow. The comparatively small sums spent by conservative engineers for structures of unquestionable security over those that are on the ragged edge of insecurity are as well justified as insurance. It is submitted that designers of structures used by the public shall have no other obligation than to provide perfect safety at the lowest possible cost. The engineer for the contractor in the problem had for his primary concern the making of a profit for his employer.

"The engineer should have examined the redesign and if, in his opinion, it had sufficient merit, he should have brought it to the attention of the owner. The owner would then decide whether or not he would have the alternate design checked. In the event the engineer did not see fit to refer the redesign to the owner, the contractor should drop the entire matter and carry out his contract."

Daniel W. Mead, Past-President and
Hon. M. Am. Soc. C.E.

Madison, Wis.

Problem No. 19, as given in the February number, will be answered in the next, or April, issue. Replies for the following question may be received until April 5, with answers in the May issue.

Question No. 20: *A consulting engineer is employed by a municipality to examine into the safety of the design of a municipal structure, which is to be built from plans from another consulting engineering firm. During his examination it becomes quite clear that the construction cost will be high, that the annual operating expense, including maintenance and depreciation, will be exorbitant, and that there will be a large waste of public funds. What obligation, if any, does the consulting engineer have in the matter of reporting this to the municipal authorities?*

SOCIETY AFFAIRS

Official and Semi-Official

Collective Bargaining Plans Actively Discussed at Annual Meeting in New York

As Shown by Abstract of Stenographic Notes of Recessed Business Meeting, Wednesday Afternoon, January 19, 1944

Long and animated discussion characterized the Wednesday afternoon business session at the Annual Meeting, which had been set aside for full consideration of the Society's plan for setting up collective bargaining units under the auspices of the Local Sections. At the start, the floor of the auditorium in the Engineering Societies Building was crowded, and though the crowd had dwindled before the meeting adjourned shortly before 6 p.m., interest in the subject was sustained, and the chairman was unable to recognize many of those who asked to be heard from the floor. Nevertheless, the three-hour session gave opportunity for expression of a wide variety of views on this controversial question, as will be disclosed in the following summary of what was said.

This being a recessed session of the annual business session that had been held in the morning, the retiring president, Ezra B. Whitman, presided. With him on the platform were the scheduled speakers, also Secretary Seabury and Howard F. Peckworth, Assistant to the Secretary, and members of the Committee on Employment Conditions, which had drawn up the plan under discussion. The committee members present were A. M. Rawn, Gail A. Hathaway, Charles W. Okey, and Richard G. Tyler. The fifth member, Ashley G. Classen, was not present.

Motion Made to Reconsider

The subject of amending the constitutions of the Local Sections to permit the establishment of collective bargaining units under the auspices of any Local Section where such action appears desirable was brought before the meeting for discussion on a motion, presented at the morning session by former Vice-President George L. Lucas, which had been tabled for consideration at the afternoon session. The motion follows:

> Moved that the Board of Direction, at its stated meeting tomorrow, January 20, reconsider: (1) the action of the Board of Direction at its Atlanta meeting, October 11, 1943, with respect to the adoption by the Board of the report of the Society's Committee on Employment Conditions; (2) and defer any further action on the matter until the whole membership of the Society has had an opportunity to review the pertinent facts in the case and express its views to our honorable Board.

Mr. Lucas, in presenting his motion, said that he felt that he was speaking for a large cross section of the Society. "I want to say this, I am greatly afraid of unionism. One has but to read the newspapers to see the trend turning against unionism. The Army has turned against the unionists; the Navy and the general public; Congress is turning against them. Why yield to it if you can avoid it? If there is any possible way, keep away from unionism.

"I feel somehow that there is a legal approach to this, and I would spend endless sums of money to fight this legally, with the best attorney the Society can afford, rather than pay a cent of tribute.

"I think a stigma will attach to us if we yield to unionism."

Troubles of the Army Engineers

First of the scheduled speakers was Col. C. B. Barker, chief of the Industrial Personnel Division, Office of the Chief of Engineers, U.S. Army, who prefaced his remarks with the statement that what he said was his personal views, not those of the Corps of Engineers. Colonel Barker said that the Army has two huge projects on which organized labor is attempting to get the right to speak for the professional group. "I do not know if everybody here realizes exactly what he is up against when he allows these people to speak for the engineer. A great many ramifications enter into it. One in particular I would like to speak about at this time is the makeup of field parties, which was one of the things, for example, set up in one of the decisions handed down by the National Labor Relations Board.

"The union insisted that these field parties be made up of certain individuals. There is a chief of party; there would have to be a transitman, a levelman, and several rodmen. Those individuals would have to be in the party if the party was composed of six people. You could not have just one levelman, three rodmen and a couple of chainmen—not necessarily chainmen—but axmen or people of that nature; but the makeup of the field party itself was such that you would have to have this type of individual in the party.

"We objected to that officially in the Corps of Engineers for the simple reason that it was a fixed-fee project, and therefore the cost to the government was going to be increased. Our objection at this time, I believe, has been sustained."

Experience of the Chemical Engineers

Charles L. Parsons, Executive Secretary of the American Chemical Society, reviewed at considerable length the experience gained by that society in dealing with the union movement as related to its members. Mr. Parsons said in part:

"We first came into this picture publicly about two years ago when at Emeryville, Calif., there was an attempt on the part of the FAECT to force the chemists and chemical engineers and other engineers in that plant to join up with them in a heterogeneous labor union which was controlled and would be, on account of its number, continuously controlled by non-professional men.

"The result of that case was that it was definitely determined by the National Labor Relations Board that professional men could not be forced into a heterogeneous union, unless they willed to do so, and that they could have a separate election to have their own rights; and if they voted in such election that they did not wish to join with such a union, they did not have to do so. The election was held; the case was won. The professional men voted not to have anything to do with the union, and they haven't had anything to do with it from that day on.

"The unions themselves don't normally want the type of man in their union that a professional man is. They do want money—anything to get it; but they don't want people who are going to bore from within, as they know, and we usually argue with them that these professional men are in confidential relations with management, that they are normally sympathetic with management. Such being the case, the union doesn't want them, and in practically every instance [in which companies in our field were being threatened with unionization of their professional men] the union came to that conclusion and the matter was ended. That has been the case in at least five instances in the last year, the unions themselves taking the initiative. In one case they went so far as to put into their agreement that any of the chemists and chemical engineers holding membership in the American Chemical Society wouldn't have to join the union."

Chemical Society Cannot Bargain

The American Chemical Society cannot become a union or a bargaining agent, according to an opinion of the society's lawyer read by Mr. Parsons:

"Membership in the society embraces both individuals and corporations. The individual membership in turn embraces both employers and employees. Therefore, by the very nature of its membership it is impossible for the society or any of its local sections, as a section of the society, to act for any of its employee members in the matters set forth in Section 7 of the National Labor Relations Act or as the representative of such employee members for the purpose of collective bargaining.

"The chief function of the society in this respect is to preserve the professional status of its members who are employed in a professional capacity in the fields of chemistry and chemical engineering. In performing this function the society not only can, but should, advise its members entitled to engage in collective bargaining not only as to their rights but as to their obligations under the law. Through its counsel it can afford them legal assistance and in any case affecting the professional status of its members or the objects of the society as set forth in its charter, it can intervene, if necessary, as a friend of the court, to make its views known and thereby to assist in obtaining a proper determination of controversial issues. The society can do nothing for its members employed in non-professional work."

History of American Society of Civil Engineers Action

Following Mr. Parsons, Director A. M. Rawn, chairman of the Society's Committee on Employment Conditions, reviewed the activities of the Society since 1937 with respect to the union movement. His statement was published in the February issue of Civil Engineering, p. 80. At the end of his review, he summarized the voting in the 15 Sections that at that time had voted to amend their constitutions in the manner recommended by his committee and approved by the Board of Direction at its October meeting. Mr. Rawn drew attention to the large affirmative vote, the average percentage being 93 for the 15 Sections (see Civil Engineering, February 1944, p. 82).

From the floor, A. S. Milinowski, consulting engineer, St. Paul, asked how many Sections had rejected the amendment, to which Mr. Rawn answered that in only one of the Sections that had voted the amendment had lost. It failed in the Sacramento Section, due to the fact that less than 50% of the subscribing members voted. He added that in 13 Local Sections the subject had been discussed in open meeting and was in the process of being balloted on; that in 11 Sections the subject has been discussed but no formal action has been taken, and in 18 Sections the matter is being studied by the local board of directors. The Mohawk-Hudson Section directors have voted not to put the proposed amendment before the membership of the Section.

From the floor, John C. Riedel, chief engineer of the Board of Estimate, New York, said that he understood that a committee of the Metropolitan Section had reported on the matter and asked whether its report could be considered in favor of the amendment. To his question, Secretary Seabury replied: "No." This answer brought James K. Finch, acting dean of the College of Engineering at Columbia University, to his feet asking as a member of the committee that prepared the report for an opportunity to comment upon Mr. Seabury's statement, which he said he believed was not a correct statement of fact.

"The committee agreed that we needed local committees on employment conditions," said Professor Finch. "We went with the board on the matter of organizing a local committee on employment conditions. The one rock on which our report breaks with the recommendations of the Society is on the method which shall be used by that local committee, not on the fact that we need such local committees, and that those local committees should be active and on the job. We break on the point that we do not believe that the professional engineer has any business adopting the relationships, methods and tactics and practices of union labor; and that if we cannot organize that local committee to carry out the objectives of the committee through professional, ethical methods, then something is wrong with the organization and with the working of our Society.

"The second point on which our committee disagrees with the Society's committee is that a definition of the professional engineer shouldn't take 173 words. The professional engineer has been legally defined in most of the states of the Union, by license, and that definition ought to be legal enough to hold. If a man possesses a license to practice professional engineering, he is obviously a professional engineer."

To Professor Finch's statement, Secretary Seabury replied: "I think I am fair in saying that both Professor Finch and I were right. I isolated Dr. Riedel's question as to whether the Metropolitan Section's committee had spoken favorably of the board's suggestion. Professor Finch has indicated that the committee discussed various topics. It suggested three or four alternatives and three or four modifications of the Board's proposal, so I epitomized those in one word, which perhaps I should not have done."

Past-President Hogan Favors the Motion

Applause greeted the statement of Past-President John P. Hogan that he was going to speak in favor of the motion. "It is all right," he added, "to say that the Local Sections can exercise their franchise in regard to the Board's recommendation, but that is not absolutely true, on account of the fact that they are now handed not something for decision, but they are handed an accepted fact upon which they can say either yes or no.

"In the first place, speaking about the practicability of this, I think you are getting into pretty deep water. You are proposing to organize a collective bargaining group for which you, yourselves, have set up the definition, and you are proposing to include in that bargaining group outsiders whom you immediately penalize by requiring them to pay more money. Right then and there I am afraid that your artificial definition will not hold; and that if your group goes, or is brought, before the present Labor Board, you will find that the ranks of those for whom you are responsible, who are not members of the Society, will be greatly increased, whether you like it or not.

"The other question that comes to my mind very strongly is that if this thing is done right, it is going to absorb more time and effort than all the time that the 3,000 members who are really working for this Society put into it.

"After all, we are coming now to a strong difference in psychology, whether we are a professional society or a welfare society. I am afraid that we are getting diverted from our main purpose."

Questions Raised by Texas Section

Questions as to how the collective bargaining groups were going to operate were raised by John H. Bringhurst, recent president of the Texas Section, "We think that the Board of Direction was very wise in giving state autonomy, or Section autonomy, so that we could use our discretion. While I can't say for sure, I don't think we are going to accept it in Texas.

"Some of the reasons why I make this statement are as follows: In the detailed operation of this change in constitutions, we find some bugs, and I expect to have them answered now, so that I can take the answers back to my colleagues.

"The first section of the revised constitution says that the board of directors of the Section has to rule on the eligibility of not only the members of our Society but the members without the Society, as to whether they can be included in a collective bargaining group in accordance with the 173-word definition of professional engineering employees. I am on the board, and I don't see how I could possibly rule in such a way that it would not have a legal kickback, if I should exclude men who thought they should be included under the definition.

"There is another point with respect to the committee of three men elected by letter ballot from those men who entered into the collective bargaining group. I have read as much as an ordinary engineer could find and digest in the decisions of the National Labor Relations Board, and while I can't cite particular cases, I have seen it in several decisions, that the adequacy of your collective bargaining group is reviewed by the National Labor Relations Board in the light of their activities. If they are active in furthering the labor conditions, bettering them, they perhaps will be allowed to continue. If they are lax in looking after the wages, hours, conditions of work and so on, they may be supplanted if there is pressure to supplant them.

"What would be the condition if we should initiate a collective bargaining agency in every Section and have them take an inactive part and do nothing constructive toward bettering the labor conditions generally throughout that area? What status would the committees have in the eyes of the National Labor Relations Board?

"That committee of three brings up another question. They must be chosen from a definitely employee group. That means they must be working for a salary, and yet they are charged with the duty and responsibility of taking care of every labor difficulty or controversy throughout, in our case, the State of Texas, which is pretty large. How many men working on a salary will be allowed by their employers to take time off to go to some distant point to sit as negotiators in labor relations, sit for days and hours with management, in trying to work out some controversy? They could not hold their jobs and they could not afford to go on their own hook. There isn't money enough set up in this provision whereby they could get it from the Society; and the Society could not legally be allowed to contribute to their expense."

To Mr. Bringhurst's question, Mr. Rawn replied: "I think that as far as Texas is concerned, in a state of that size, it probably wouldn't be amiss to have two or three collective bargaining groups, if necessary."

In further answer, Mr. Peckworth said that Mr. Bringhurst was quite right in his statement that a bargaining group is judged by its actions and not by its avowed purpose. On the matter of the local committees on employment conditions going from one place to another in a state as large as Texas, he added that this is one of the difficulties of the subject, but stated that it is perfectly proper for members of a bargaining group to delegate their bargaining rights to one person in one case and to another person in another case.

On a question raised by Mr. Bringhurst as to why the Society should not work to have professional engineers excluded from collective bargaining, like mechanics or other trades and stop right there, Mr. Peckworth said, "The professional man may be excluded from a heterogeneous bargaining group, but to be excluded, he has to make his wishes known. If that professional man sits tight and does nothing, his bargaining rights are assumed for him by some other bargaining group. That is the point of the whole matter. The professionally minded men must form a group of their own, must delegate their authority to delegates of their own choosing, and have those men act. Then they can be distinguished in a separate unit, separate and distinct from the heterogeneous bargaining group. If they do not act, some other bargaining group with which they may not wish to be identified will assume their bargaining rights for them."

UNIONS MIGHT TAKE OVER

R. E. Spaulding, consulting engineer, Jacksonville, said, "Of course, there is a tendency on the part of young engineers to become union minded because their wages are less than the labor unions can get for their members. That is a natural feeling; but they are not represented by racketeers and manipulators. It is my firm conviction that all this will result in setting up some beautiful collective bargaining agencies for some union to take over, and they will take it over—make no mistake about it."

When the applause following this comment had subsided, Mr. Rawn responded: "You don't change men's character by regrouping them. We have certain types of individuals who are in the American Society of Civil Engineers. They have been carefully scanned, they have been carefully investigated. If regrouping them is going to change their character, and if you feel that it will, then that might be dangerous. If engineers are unable to regulate their professional conduct or professional action so as to become what has been termed here today as labor exploiters, they probably shouldn't be allowed to control their own interests, or control their own destinies, or do their own bargaining." That response also was greeted by applause.

SPECIFIC PROBLEMS PRESENTED

Discussion was switched from the abstract issues to specific cases by Joseph D. Lewin, who said, "I would like to speak for collective bargaining in the New York area. The past summer was a very restless one for the civil engineers in New York. Many defense projects were nearing completion. Designing offices were reducing their staffs, construction men were out of jobs, and no new projects in our line were available. Many of us had to adapt ourselves to other industries and were absorbed by them.

"The employment conditions were intensified by the release of a large number of civil service engineers by the City of New York. In fact, there was a period when there were 400 engineers in New York without a job. These men were forced into other industries. They were hired mostly on an hourly-wage basis, very often at ridiculously low salaries, often under humiliating conditions . . . . Then came the November issue of CIVIL ENGINEERING. The resolution adopted at Atlanta was an inspiration. It seemed to us that the rank-and-file engineer had not been forgotten.

"We are facing the problem of the economic well-being of engineers. Let us approach this problem in a professional manner without emotion, and with clear and unbiased minds. The legal basis today of relationship between engineer-employer and engineer-employee is the Wagner Act. Any attempt or wishful thinking to change it will not be successful, and the reason is simple. There are 100,000 civil engineers in the United States (19,000 of them are members of our Society) and only 1,900 to 2,000 of these are engineer-employers. The rest, or 98,000 engineers, are employees.

"Today these employees enjoy legal protection. Any move to exclude an engineer from the Wage and Hour Law will result in the engineer being cheated of his overtime. Any attempt to exclude him from a collective bargaining law will result in ruthless underpayment.

"There is another phase which is quite important. Today we are working in other industries. We are thrown together with many sub-professional men, without technical degrees, like draftsmen and tracers. These men outnumber the professional engineers. They choose to join the CIO or some other union. An election is held under the supervision of the NLRB. The union wins. A closed shop is demanded of the employer and obtained.

"The engineer faces the problem of staying as a CIO member or being fired. Can he quit? The conditions in any other job are identical. In six months there will not be a single large company left in New York which has not been unionized.

"Since November I have talked to over 200 members of our Section. All of us want to have a free discussion of collective bargaining and a secret ballot. However, we did not have any discussion. Last Tuesday we were informed that a committee had been appointed by Commissioner Huie, our president. This committee prepared the report that has been mentioned before, and this report was adopted by the directors of our Section and forwarded to the Board of Direction.

"Gentlemen, this report has never been discussed by the membership nor presented to them, nor has it been voted upon by the members. Therefore, I would like to go on record against such union-like methods. Such high-pressure tactics should be considered as inconsistent with the ethics of our Society."

COLLECTIVE BARGAINING STRONGLY OPPOSED

When the laughter that greeted Mr. Lewin's thrust at the board of directors of the Metropolitan Section had subsided, the Chairman recognized O. G. Julian of Jackson and Moreland, consulting engineers, Boston, President of the Northeastern Section, who made the most forceful speech of the afternoon against collective bargaining.

"Discussion of the institution of collective bargaining facilities for engineers at this time," said Mr. Julian, "is somewhat similar to committing a man to jail, giving him a criminal record, and holding his trial three months later. The entire procedure appears to be in reverse.

"The Atlanta action of the Board of Direction transformed the American Society of Civil Engineers into an unnecessary, undesirable, and impotent labor union. Whether or not we can regain our former status as a society of professional men is a moot question.

"Much that has been said and written by the proponents of unionization of engineers implies strongly that a professional man, in order to practice in an employee capacity, is forced by law to belong to a collective bargaining group, a union. That is a misconception, most misleading and entirely fallacious. No one is forced by law to belong to a collective bargaining group or a labor union. Except in cases covered by the above mentioned misconception, a professional man usually joins a union for one or both of two reasons: (1) immediate financial gain, (2) because he has not sufficient moral fortitude to withstand the blandishments of high-voltage salesmen or the pressure that may be exerted by organized labor.

"This society should have such fortitude and should be able, ready, and willing to fight for and maintain constitutional rights and the professional status of its members. If necessary, the battle should be carried to the highest court in the land.

"Since the institution of collective bargaining facilities is manifestly outside of the scope of the charter, and at variance with the spirit and intent of the Constitution, the Atlanta action is conary to the rules of equity and morally wrong. It has inspired the subsequent action taken by some of the Local Sections. It has reduced the status of employee-professional engineers to that of laborers, and robbed them of freedom, opportunity, and initiative. The only explanation for it is immediate expediency, an easy way of doing something at once. It should be rescinded for its shortsighted, fundamentally wrong, impractical, and questionable legality."

Mr. Julian was interrupted at this point by applause.

"After the great wrong done our membership has thus been righted," continued Mr. Julian, "rational and ethical steps should be taken to improve the material status of the profession as a whole. Any such momentous change as that implemented by the Atlanta action should be seriously considered and discussed by the entire Society for at least a year, after which period it should be put to a national ballot, with the idea of possibly extending the charter and amending the Constitution. It would be preferable to settle the matter during normal times rather than in the midst of a national emergency.

"I would like to heartily endorse the motion made this morning by Mr. Lucas. If anything, I would like to strengthen it."

From the floor a member asked the Chairman to request speakers to say whether they were employees or employers as that would help in weighing their statements. To this Chairman Whitman replied: "If I am not mistaken, I think the great majority of people who have spoken are either employers, or what would be put in the employer class. As a matter of fact, as I look this audience over, I think there are very few men in this room who would be in a collective bargaining unit or would be in the employee class."

Members Under Arms Profit by Special Society Privileges

Many younger Society members in the armed services are entitled to special consideration in the matter of dues. For those who may have missed the previous announcement, a repetition of the action of the Board of Direction at its October meeting is given as follows:

"Cancellation of 1944 dues is hereby extended automatically to all those members of the Society in the armed services of the United States who are Selectees; and, upon request for such cancellation, to those commissioned officers receiving base pay of $2,400 or less. Those who receive this exemption will continue to be listed as members of the Society and have prior unpaid dues canceled; and those who are Corporate Members shall retain their voting rights. However, no publications except Civil Engineering are to be forwarded to those thus exempted."

Unions Defended

Scott B. Lilly, Professor of Civil Engineering at Swarthmore College, was the next speaker to be recognized. He also is a Director of the Society. In opening his remarks, Professor Lilly said that the first thing we must do in considering this subject is to get away from the implication of words. "Our last speaker has talked about unionization. Many of our speakers in opposing the action of the Board have stressed the things that occur when collective bargaining fails.

"The thing that I want to talk to you about is the other side of this picture—what are the conditions under which it *works*. We are talking about forming in our Local Sections groups which are going to bargain with their employers, if occasion arises. These groups are going to be composed of our members—men of good will. I trust that they are going to be bargaining with employers who are also men of good will.

"The purpose of collective bargaining is to reach an understanding, a meeting of minds. It has been my privilege in the last three years to come in close contact with a great number of men who are working men, or who started out as working men, and who then were in positions as leaders, foremen, even superintendents in one of our very large industries. I can assure you that from my contact with this group it is my firm conviction that the ordinary man, the ordinary, labor-union member, is not in sympathy with the leadership that he is receiving; that he does not want to restrict output; he does not want to strike; he doesn't want to do any of the things that each of the many speakers here has suggested go along with unionism.

"I agree with some of the previous speakers that there is going to be a change in our labor laws. I believe that the change is going to come when the union members themselves are able to make themselves heard. If we could get legislation compelling the accounting of funds of labor unions, and legislation setting forth the responsibility of labor unions, we would get rid of many of our racketeers and many of the conditions that we all deplore.

"We are setting up bargaining groups under a plan that has been submitted by the Board of Direction to the Local Sections which will enable those young engineers to protect themselves from the inroads of a union. Those bargaining groups will not have to strike; they will not have to restrict output. All they need to do is to bring their problems to the employer. This movement is for the benefit of the employer as much as it is for the benefit of the employee. I have discussed this matter with many employers, and they all say to me that they would much prefer to deal with men who understand conditions than to deal with someone who knows nothing about them.

"We are faced with the condition that if our members do not have a chance to join a group, they will be compelled to join labor unions. They need a bargaining group to look after their rights. We are facing this condition and we must act. We are not acting as a matter of expediency. We are acting to protect the best interests of the younger men of our profession. If we, members of the American Society of Civil Engineers, are so shaky in our convictions that we are professional engineers that we cannot do the right thing for our younger men, then I do not believe we should be called professional engineers."

Applause interrupted Professor Lilly at this point.

"You can say it is unlawful; you can say it is ill-advised; you can say that we may run into difficulties. But, gentlemen, as long as we follow our highest convictions and do the best that we can for our fellow members, I cannot think that the dignity of the American Society of Civil Engineers will ever suffer."

Possible Loss of Control

From the floor, E. H. Cameron, of the firm of Jackson and Moreland, Boston, asked whether it was not probable that the proposed collective bargaining groups might not get out of the control of the Society. "Non-members can join them, and there is nothing to stop such outsiders from being in the majority—men not held to the high standards of the American Society of Civil Engineers. Of course, it is a good bet there will be strikes, and they will be in our name; and you won't like it.

"Some think these baby unions will be of doubtful legitimacy. The unions will be sponsored and financed by the American Society of Civil Engineers, which has many employer members. How else can the law regard them than as company unions, which are not acceptable as bargaining groups? If this is true, are we not just setting up something for the authorities to reject and for others, who can meet the rules, to take over readymade for them? The man from Jacksonville beat me to that."

Experience in Seattle

At this point Chairman Whitman asked Prof. Richard G. Tyler, member of the Committee on Employment Conditions, to tell some of the experiences with unions in the Seattle region in the hope that it would answer some of the questions that had been asked concerning the practical operation of the proposed collective bargaining groups. To indicate what has been done in Seattle along the line of unionization, Prof. Tyler said:

"The city engineer's office has been largely unionized. Something was said a moment ago about municipal officials being excluded from bargaining groups. About one-half of the department heads belong to the union, about half of them do not, and most of the younger people do.

"The county engineer's office is almost 100% unionized. The state highway department, shipyards and war industries are all practically 100% unionized, except Boeing Aircraft, which is not.

"We don't propose to go in and try to do something about those closed-shop situations. If they come to us, that is another proposition. We expect, however, to serve such groups as Boeing's—those groups which have asked us to do something.

"As the young man from New York said a moment ago, these lads feel that they are in a bad spot. They are afraid of what the employer-engineers over the country will think of their union record, if they are in unions. They don't want to be in unions. They have nothing against the unions. We have nothing against the unions in Seattle, in a general way.

"There may be some labor leaders we do not like. But the problem is this: that most of those people are already organized, are already in unions. They desire to have their problems handled on a professional basis, by people of their own type—that is, people in their own profession—rather than by the sub-professional group which makes up the largest number in their union.

"The matter of being classed as a company union has been brought up. We have discussed that in Seattle. It remains to be tried out in the courts. However, as has been mentioned by the gentleman from the American Chemical Society, that matter has been settled. Mr. Peckworth has told you of some situations where the Labor Board has already passed upon certain groups and has received their proposition favorably. So it seems to me that it has been passed upon, but has not as yet gone to the courts.

"It might be well, however, to remember that the Society as such is not an employer of any of the people who are joining the bargaining group, and attorneys have told us that these would not be considered, therefore, company unions.

"It seems to us in Seattle that the problem is one that has to be handled now. If the other engineering societies will cooperate, of course so much the better, but it is something that can't be waited for. The question of changing the law is a matter that takes a long period of time.

"Let me say just one word concerning the matter of including only men with an engineer's license. We discussed whether or not licensing might be considered a basis upon which to define membership, but we found that it left out so many of the junior members, the people who are mainly to be helped by the setting up of this organization, that we decided against it.

"We feel in Seattle that we will go ahead. We think it is a thing that we want to do. We have no fear of the union taking over this organization, because the people who come into it have the right to go into unions in the first place. Many of them are already in the unions, and have come to us with the request that we help them, so that they will have this professional assistance."

A VOTE DEMANDED

By this time, there were insistent calls from the floor for the question, but the chairman recognized Irving V. A. Huie, president of the Metropolitan Section, who had been trying to get the floor to answer a point raised by Mr. Lewin. Mr. Lewin was in error, he said, in stating that the board of the Metropolitan Section had adopted a report of its special committee studying the collective bargaining question. Mr. Huie said the report referred to by Mr. Lewin was an interim report, which the directors of the Metropolitan Section deliberately made an interim report until after hearing the arguments at this meeting.

"I assure Mr. Lewin that members of the board of directors of the Metropolitan Section had no idea of precipitously arriving at a conclusion in this most vital question.

"Not as president of the Section, but as a member, I would like to say this to you gentlemen: I choose to take the position personally that the Society is fundamentally a professional body and formed for that purpose. Are we going to uphold the professional principles embodied in our Constitution, or shall we discard them and go ahead with the suggested amendments?"

VOTE AGAIN CALLED FOR

By this time the cries of "Question" drowned out other attempts to be heard. Before calling for a vote, the chairman recognized John H. Porteous, also of the firm of Jackson and Moreland, Boston, who urged that an effort be made to change the Labor Relations Act to exclude professional men. To this the chairman replied that the Board of Direction, at its meeting held the day previous, had appointed a committee to look into the matter of obtaining such a change in the act.

A rising vote was called for, and after the count had been taken, Secretary Seabury announced that 97 had voted for the motion to request the Board of Direction to reconsider the action it had taken at Atlanta, and that 120 had voted against it. The meeting adjourned at 5:45 p.m.

Revised Meeting Schedule for 1944

ACCORDING to a new program recently adopted in what is expected to be final form, the 1944 schedule of Board and Society meetings is as follows:

Spring Meeting of the Board, in April, with the St. Louis Section
Summer Convention, in July, at Cleveland, Ohio
Fall Meeting of the Board, in October, with the Colorado Section in Denver

It will be noted that the main change is in the Society's Convention, which is transferred from Chicago to Cleveland. This is the only official Society meeting of the year outside of the Annual Meeting in New York. The change of locale for the Conention is fully explained by the fact that Chicago is to be host this summer to two huge political conventions.

Headquarters for the St. Louis Meeting will be at the Coronado Hotel. The Board committees will meet on Sunday, April 23, and the Board itself will gather on Monday and Tuesday, April 24 and 25. A Regional Local Section Conference will also be held all day Tuesday. Meetings of the St. Louis Section, including technical papers and social events, are scheduled for Wednesday and Thursday, April 26 and 27.

Dates for the Society Convention in Cleveland are set for the three days beginning Wednesday, July 19. Prior to that, the Board committees will meet on Sunday, July 16, and the Board proper on the following two days, July 17 and 18. Again, Tuesday has been allocated to the Local Sections for a regional conference. Headquarters will be at the Hotel Cleveland, in the Cleveland Union Terminal Building.

By invitation of the Colorado Section, the Board of Direction will meet this fall in Denver. The date has been set for the week beginning October 8, at the Brown Palace Hotel. Announcement will be made later as to the details of the Colorado Section meetings and of the Local Section Conference, which will be coordinated with the sessions of the Board.

The somewhat centralized locations selected for the 1944 meetings are in deference to the need for limited railway travel. Both St. Louis and Cleveland are relatively near to the center of gravity of Society membership.

New Committee on Employment Conditions

AT ITS January meeting, the Outgoing Board established a new Society committee, the "Committee on Employment Conditions." This was accomplished by amendment to the "By-Laws, Article IV, Committees," in accordance with formal notice of the proposed change given at the previous Board meeting.

The changes are in Section 11 of Article IV. The list of committees, third paragraph, was amended by insertion of the name, "Committee on Employment Conditions," to form the fifth of six professional committees mentioned. The duties of the committee will be included as a new paragraph (*e*) in the proper position, the present paragraph (*e*) being renumbered "(*f*)." The new paragraph as adopted by the Board reads as follows:

> "(*e*) The Committee on Employment Conditions shall collect, codify and prepare for distribution such data as may be calculated to be of value to civil engineers, both those who employ and those who are employed, in connection with the fair and ethical treatment to be accorded both employers and employees respecting service to be rendered, period of engagement and termination thereof, vacation, sick and overtime leaves, retirement and pension plans, etc., civil service regulations, federal statutes and other economic and social conditions of employment. It shall also organize so as to be of practical assistance when called upon in the adjustment of disputes arising out of conditions of employment."

With the adoption of this amendment, the Committee on Employment Conditions becomes established as one of the Society's Special Committees.

Meeting of the Outgoing Board of Direction—Secretary's Abstract

THE BOARD of Direction met at Society Headquarters on Monday and Tuesday, January 17 and 18, 1944, with the following members present: President Ezra B. Whitman in the chair; George T. Seabury, Secretary; Past-President Black; Vice-Presidents Spofford, Stanton, Hastings, and Agg; and Directors Bakenhus, Boughton, Breed, Burpee, Carey, Cowper, Cunningham, Dickinson, Dougherty, Edwards, Goodrich, Howard, Lilly, Massey, Rawn, Requardt, Scobey, Wiley; and Treasurer Trout.

In accordance with custom, new members of the Incoming Board, by special invitation, attended some or all the sessions. Included were: Messrs. Malcolm Pirnie, R. E. Dougherty, Franklin Thomas, S. C. Hollister, G. A. Hathaway, R. W. Gamble, W. M. Wilson, F. C. Tolles, W. D. Shannon, and R. J. Tipton.

Approval of Minutes

Minutes of the meeting of the Board of Direction of October 11 and 12 held at Atlanta, Ga., were approved as written. Similarly, minutes of the Executive Committee Meetings on October 10, October 13, and December 12 were approved as written. The actions taken at the latter meeting were voted the actions of the Board.

Annual Report of the Board

Draft of the Annual Report of the Board was presented, and after Board approval, was adopted and ordered printed.

Juniors in Armed Services

It is expected that, during the war, normal membership transfers of Juniors may be impeded. The Board therefore enacted that Juniors in the armed forces, upon reaching the constitutional limiting age of 35, shall not be dropped but shall be placed on an "Inactive List."

District of Columbia Section to Have Its Own District

Report of the Committee on Districts and Zones was presented and adopted, whereby the Local Section constituting the District of Columbia area is set up as a separate District 5, with the Maryland and Virginia Local Section areas added to those of the West Virginia and Pittsburgh Sections in District 6. Details of this action are given in a separate item.

Resignation of Hal H. Hale, Washington Representative

The Board was in receipt of the resignation of Hal H. Hale as the Society's Washington Representative in order that he may become executive secretary of the American Association of State Highway Officials. Mr. Hale presented a letter of gratitude and appreciation; and the Board extended to him a vote of commendation for his two years of service in Washington.

Collective Bargaining

Responding to requests from the Board of Directors of the Metropolitan Section (N.Y.), and from individuals, the Board gave extended discussion to its action taken at the Atlanta Meeting when it recommended to Local Sections that they make provision for the establishment of collective bargaining groups of "Professional Engineering Employees" in their respective areas. Action was to adhere to the former action.

Toward Legislative Relief Against Coercion in Engineering Employment

Further addressing itself to the problems of employment, the Board authorized the appointment of a committee to pursue the special "task of devising and directing the accomplishment of a program which will secure national legislation which will relieve any professional engineer, in any branch of professional engineering, from being forced to join or to be included in or in any way to be controlled by any bargaining group or union—unless he should of his own choice and option desire so to be identified and represented."

Encroachment of Government Engineering on Private Practice

A number of communications were presented expressing concern at the tendency toward government competition which tends to exclude independently practicing engineers from their normal engagements. Such communications included a resolution adopted by the American Institute of Consulting Engineers; a letter from a group of Texas engineers, supported by individual letters; a resolution adopted by the Oklahoma Section, which was supplemented by a petition circulated among engineers in Oklahoma to the same effect. Action was the authorization of a committee to go into the whole matter of competition by the Federal Government with engineers in private practice.

New Professional Committee on Employment Conditions

Formal notice was given at the October Board meeting of a proposal to amend "Article IV—Committees," of the By-Laws, to include a "Committee on Employment Conditions." Details of the duties of the Committee were enumerated. The proposed amendment was officially presented and unaminously adopted, in the form given elsewhere in a separate item.

Report on Salaries

At its October meeting the Board adopted the Report of the Committee on Salaries which, however, was not to receive general publicity until certain clarifications were to be considered. Not being satisfied that the necessary clarifications have yet been made, the Report is to be further considered before release.

Proposed Amendment

Notice was given of the submission for action at the next meeting of an amendment to Article IV of the By-Laws, establishing a Committee on Private Engineering Practice in substitution for the present Committee on Fees and redefining its functions.

Local Section Administration

Provision for financing Local Sections was adopted. In this connection the requirements as to the number of meetings held were relaxed somewhat to conform with the exigencies of Local Section opportunities in wartime. In addition, Local Section Conferences were authorized for the three meetings of the Board to be held during the remainder of the year. The Board will meet with the St. Louis Local Section meeting in April and the Denver Section in October. The Convention will be held in Cleveland in July.

Engineering Education

Following recommendation of the Committee on Engineering Education, the Board approved cooperation of the Committee with a similar committee of the Civil Engineering Division of The Society for the Promotion of Engineering Education. It also authorized the sending of letters to members of Student Chapters now in the armed services, "expressing the desire of the Society to be of service in every way possible in aiding the student along his professional pathway."

Budget

Recommendation of the budget for 1944 was received from the Executive Committee. After full discussion, including amendments, it was passed to the Incoming Board with recommendation of approval.

Other Committees and Reports

Communications and progress reports were received from various committees with discussion and appropriate action in each instance.

Adjournment

After distribution of certificates to the several retiring members, the Board adjourned at 5:30 p.m. on January 18.

Meeting of the Incoming Board of Direction—Secretary's Abstract

THE INCOMING Board of Direction met at Society Headquarters on January 20, 1944, with President Malcolm Pirnie in the chair; and present George T. Seabury, Secretary; Past-Presidents Black and Whitman; Vice-Presidents Hastings, Agg, R. E. Dougherty, and Thomas; and Directors Bakenhus, Boughton, Breed, Burpee, Dickinson, N. W. Dougherty, Edwards, Gamble, Goodrich, Hathaway, Hollister, Lilly, Rawn, Scobey, Shannon, Tipton, Tolles, Wilson; and Treasurer Trout.

1944 Board of Direction of the Society

Starting at near corner of table and proceeding clockwise: Frank C. Tolles, Director, District 9; R. W. Gamble, Director, District 7; Franklin Thomas, Vice-President, Zone IV; Gail A. Hathaway, Director, District 5; William D. Shannon, Director, District 12; Dean G. Edwards, Director, District 1; William D. Dickinson, Director, District 14; Scott B. Lilly, Director, District 4; C. F. Goodrich, Director, District 6; Fred C. Scobey, Director, District 13; R. E. Bakenhus, Director, District 1; N. W. Dougherty, Director, District 10; T. R. Agg, Vice-President, Zone III; E. B. Black, Past-President; E. M. Hastings, Vice-President, Zone II; Van Tuyl Boughton, Director, District 1; Charles E. Trout, Treasurer; Miss Carolina Crook, Secretary to Mr. Seabury; George T. Seabury, Secretary; Malcolm Pirnie, President; Wilbur M. Wilson, Director, District 8; R. E. Dougherty, Vice-President, Zone I; S. C. Hollister, Director, District 3; and R. J. Tipton, Director, District 16.

Column Research Council

Responsive to a request from the Structural Division, the Board approved formation of a Column Research Council by the Division, to work in cooperation with the Engineering Foundation if possible.

Budget Approved

Recommendations were received from the outgoing Board as to the recommended budget for 1944. After discussion, including the incorporation of minor revisions, the budget totaling approximately $500,000 was adopted.

Society Committees

Acting on the suggestion of the President, the Board approved the following make-up of committees for 1944:

Executive Committee: Malcolm Pirnie, *Chairman;* George W. Burpee, *Vice-Chairman;* E. B. Black, R. E. Dougherty, E. M. Hastings, and Ezra B. Whitman.

Committee on Honorary Membership: Malcolm Pirnie, *Chairman;* Ezra B. Whitman, E. B. Black, R. E. Dougherty, E. M. Hastings, Franklin Thomas, and, T. R. Agg.

Committee on Publications: Scott B. Lilly, *Chairman;* N. W. Dougherty, S. G. Hollister, Fred C. Scobey, and Wilbur M. Wilson.

Committee on Membership Qualifications: V. T. Boughton, *Chairman;* Charles B. Breed, William D. Dickinson, Dean G. Edwards, Gail A. Hathaway, and William D. Shannon.

Committee on Professional Conduct: Fred C. Scobey, *Chairman;* V. T. Boughton, N. W. Dougherty, C. F. Goodrich, A. M. Rawn, and, R. J. Tipton.

Committee on Districts and Zones: Franklin Thomas, *Chairman;* R. E. Bakenhus, Raleigh W. Gamble, J. T. L. McNew, and William D. Shannon.

Committee on Division Activities: E. M. Hastings, *Chairman;* R. E. Dougherty, Scott B. Lilly, R. J. Tipton, and Frank C. Tolles.

Committee on Society Relations: George W. Burpee, *Chairman;* R. E. Bakenhus, and, Dean G. Edwards.

Committee on Local Sections: Francis H. Kingsbury, *Chairman* ('45); Fred H. Rhodes, Jr. ('46), Lloyd D. Knapp ('47), Robert M. Angas ('48), and Wilbur M. Wilson, *Contact Member.*

Committee on Juniors: C. A. Mockmore, *Chairman* ('45); John H. Gardiner ('46), Dana E. Kepner ('47), Thomas M. Lowe ('48), and William D. Dickinson, *Contact Member.*

Committee on Student Chapters: Frank W. Stubbs, Jr., *Chairman* ('45); Ben S. Morrow ('46), Donald C. A. duPlantier ('47), G. Brooks Earnest ('48), and Scott B. Lilly, *Contact Member.*

Committee on Engineering Education: Ivan C. Crawford, *Chairman* ('46); William J. Shea ('45), Clarence L. Eckel ('47), Harold E. Wessman ('48), and Franklin Thomas, *Contact Member.*

Committee on Fees: Edward N. Noyes, *Chairman* ('45); Clarence McDonough ('46), L. H. Nishkian ('47), John W. Cunningham ('48), and Charles B. Breed, *Contact Member.*

Committee on Registration of Engineers: T. Keith Legare, *Chairman* ('45); Robert H. Craig ('46), Harold G. Sours ('47), George M. Shepard ('47), and N. W. Dougherty, *Contact Member.*

Committee on Salaries: Thomas E. Stanton, *Chairman* ('45); Ernest J. Stocking ('46), C. F. Goodrich ('46), Charles S. Shaughnessy ('47), and E. B. Black ('47).

Committee on Employment Conditions: A. M. Rawn, *Chairman* ('45); Ashley G. Classen ('45), C. W. Okey ('46), Richard G. Tyler ('47), and William N. Carey ('48).

Committee on Professional Objectives: Thomas R. Agg, *Chairman* ('45); A. M. Rawn ('45), Glenn L. Parker ('45), Fred C. Scobey ('46), F. H. McDonald ('46), F. H. Richardson ('47), and Gordon M. Fair ('48).

Committee on Technical Procedure: E. M. Hastings, *Chairman;* R. E. Dougherty, Scott B. Lilly, R. J. Tipton, Frank C. Tolles, John Nolen, Jr., A. J. Ackerman, E. D. Gilman, R. L. Morrison, Boris A. Bakhmeteff, E. L. Myers, Herbert J. Flagg, Raymond F. Goudey, Joel D. Justin, Charles A. Ellis, Philip Kissam, and W. G. Atwood.

Adjournment

The Board adjourned to meet on Monday, April 24, 1944, at the Hotel Coronado, St. Louis, Mo.

Society's Committee Presents Public Works Bill

In one of his final actions as President of the Society, Ezra B. Whitman appeared on January 12, 1944, before the Lanham Committee which was holding Congressional hearings on postwar planning, and advocated an appropriation for construction projects under a single federal agency.

President Whitman submitted the policy statement of the Society's Committee on Postwar Construction (see Civil Engineering, September 1943, pp. 439–442). He declared that one agency should be responsible for all federal postwar construction planning activities; that funds for planning were a small but necessary part of construction preparations; that federal loans would be helpful in causing state and local government preparations to get under way, and that Congress should announce as soon as possible a national policy with respect to postwar planning.

President Whitman then presented Hal H. Hale, a member of the Society's Committee on Postwar Construction, who submitted, in behalf of the Society's Postwar Construction Committee, a draft of a bill which would authorize the Federal Works Agency to use a revolving fund of $60,000,000 for loans to public bodies for planning postwar works. The appropriation would cover the period ending July 1, 1945, with an initial release of $10,000,000 for the period ending next June 30. The proposed bill would require repayment of all planning advances when construction funds are appropriated by public bodies, and involved no commitment on federal funds for construction.

Chairman Fritz G. Lanham thanked President Whitman and Mr. Hale for presenting concrete proposals and declared that the Committee will consider them fully. The text of the proposed bill follows:

A Bill

To encourage and expedite the completion by public bodies, of surveys, design studies, working drawings, specifications, and other essentials which are prerequisite to the letting of construction contracts for useful public works; to the end that there may be created a large reserve of such projects which may be placed under construction promptly, if, as and when required to provide needed public facilities; to stimulate the general economy and provide useful employment.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Federal Works Agency, acting through the Federal Works Administrator, is hereby authorized and directed, in the manner and to the extent hereinafter prescribed, to aid the respective agencies of the State and of the political subdivisions or public bodies in the States authorized by the laws of the States to construct, repair, improve, or provide public works, in financing the cost of making surveys and design studies, of the preparation of working drawings and specifications, and of other essential work prerequisite to the letting of construction contracts for public works, but exclusive of the acquisition of rights of way.

Section 2. As used in this Act "applicant" means any agency or public body of any State of the United States, authorized by the law of the State to construct, repair, improve, or provide public works and applying for Federal aid hereunder. "Preliminary work" means and includes surveys, studies, data, designs, plans, drawings, specifications, estimates, reports, contract and other documents required by law or customarily or properly prepared in the development of projects of public works, prior to the execution of contracts for the financing and accomplishment of a project. "Preliminary Report" means such data, plans, specifications, estimates, and other information concerning the project as are customarily submitted to a legislative body to enable it to determine the desirability of completing preliminary work thereon. "Final Documents" means the residue of preliminary work.

Section 3(a). The Administrator shall apportion tentatively 96 per cent of the funds appropriated to carry out the purpose of this Act as follows:

One-third among all the States in the proportion that the area of each State bears to the area of all the States. Two-thirds among all the States in the proportion that the population of each State, as determined by the last decennial census, bears to the population of all the States.

(*b*) Six months after the date of approval of this Act, the Administrator may allocate in the same proportion any balance of the apportionment described in (*a*) of this Section, to the extent that it has not been and will not be applied for.

(*c*) Four per cent of such funds, or so much thereof as may be necessary, shall be available for the administrative and technical expenses of the Federal Works Agency in carrying out the purposes of this Act.

Section 4. The Administrator is authorized to aid in financing preliminary work on projects of applicants as follows:

Upon his approval of an adequate preliminary report on a project for a needed public work, he shall pay to the applicant an amount not to exceed one per cent of the estimated cost of the accomplishment of the project, exclusive of the cost of acquisition of land.

Upon his approval of adequate final documents on such project, he shall pay to the applicant an additional amount, toward the cost of preparing such documents, of not more than four per cent of its cost as estimated by said documents, upon the agreement of the applicant to repay to the United States this and the prior payment, if and when funds become available to the applicant from any source, for the accomplishment of the project.

Section 5. The Secretary of the Treasury is authorized and directed to pay to the applicant, upon the certificate of the Administrator, the amounts of said payments. Repayments of the advances as agreed shall be remitted when due to the Secretary of the Treasury and credited by him to "miscellaneous receipts."

Section 6. The Administrator is authorized to prescribe rules and regulations to carry out the purpose of this Act, provide for the time and place for submitting applications, their form, the context of preliminary reports and final documents, criteria for approval and other relevant matters. Administration of this Act shall be decentralized as far as possible.

Section 7. There is hereby authorized to be apportioned for the fiscal year ending June 30, 1944, a sum of $10,000,000 and for the fiscal year ending June 30, 1945, a sum of $50,000,000 to carry out the purposes of this Act.

The Engineer in Foreign Service

VII. Soldiering in the Hottest Place in the World

By Eugene P. Fortson, Jr., Assoc. M. Am. Soc. C.E.

Major, Corps of Engineers

Generally held is the opinion that natives of torrid countries are the best workers in hot weather. But the American soldier is demonstrating that he need concede the palm to no one when it comes to taking the heat while putting out the work. So he has shown in getting aid to Russia during the past summer in the Persian Gulf area.

Let no one doubt the extremity and the persistence of the heat in the arid waste which surrounds the Persian Gulf. The British, who have campaigned in more different regions than anyone else, readily acknowledge it to be the hottest place on the globe. Comparable to north Florida in latitude, the country is geographically temperate. But summer comes early and stays late. May and its counterpart October are like the usual summer in the States; June and September are reminiscent of summer in certain desert areas of the Southwest; July and August surpass all summers on earth and one must turn to the Scriptures for comparison.

Rain is unknown during the summer; even a cloud of any extent at all is extremely rare. Usual maximum temperatures are 110 to 115, but the high 120's are not unknown. (The temperatures quoted are proper meteorological data. Fantastic desert temperatures of 150 and higher are often mentioned. However, these are "sun" temperatures or temperatures taken in tents, small rooms, truck cabs, etc.)

Life owes its existence during the hours of extreme heat to the *shimal*, the prevailing northwesterly wind from the desert, which is dry, thus affording cooling by rapid evaporation of perspiration. But this beneficial agency on occasion fails when the dread date-ripening wind comes heavily laden with moisture from the Gulf. At such times the forenoon relative humidity may be in the order of 90%.

Protection from the ever-present sun is the continuing necessity. It early became apparent that the government issued pyramidal tent was utterly unsuited, the radiant heat intercepted by the single thickness of canvas quickly rendering the interior a veritable inferno. Limited success was had with the British so-called Bombay tent, which resembles our circus tent in shape, and is a clever contrivance of padded double thicknesses of canvas with vented air spaces between. But full measure of comfort can only be obtained through emulation of the natives, who live in houses of mud and straw with walls and roofs so thick as to render them virtually above-ground caves.

Present practice in troop housing provides buildings with solid walls of native brick and roofs of thick straw matting covered with mud. Floors are of concrete. Windows are wooden casements with wire-reinforced plastic substituted for glass, which is unobtainable.

The hours from noon until five find most operations halted and the troops under shelter, advantage being taken of the relative coolness of night to accomplish the major portion of the day's tasks. A necessary exception is the life of a heroic few among the engineers, who must utilize all daylight time to keep road-building machinery in operation. Given no alternative, they suffer the full day's measure of blazing heat in the desert in a manner to reflect pride on their arm. Credit for similar necessary sacrifice is due the men who must keep the trains and trucks continuously moving up the corridor to Russia.

Principal difference in the clothing of the soldier on the Persian Gulf and his fellow in our tropical garrisons is the sun helmet. The total absence of rain rendering the waterproof quality of the American fiber helmet unnecessary, the preference lies with the British helmet, the thick pith walls of which afford greater insulation from the sun. Neck cloths are affixed to the helmet to assure complete protection. While shorts are superior to slacks as regards coolness and comfort, their use is not permitted because of the increased hazard of malarial infection through the bite of the mosquito. Rolling of the sleeves, long the most intolerable of rookie misdemeanors, has had to be authorized for daylight hours in the interest of comfort. Woolen socks are favored; undershirts and pajamas disdained; neckties unthinkable.

As is to be expected, heat stroke and heat prostration are of paramount concern as health factors affecting efficiency. All dispensaries and first-aid installations at all operations are provided with air-conditioned heat-treatment rooms. An intensive educational program is carried on to make troops aware of the extreme danger of illnesses due to heat, and to encourage them to take precautions, such as abstaining from liquor, taking salt pills (available in all messes), and keeping properly clothed. Bronzed torsos may be assets on the beaches in the States, but in Persia they are heavy liabilities from the health standpoint.

While only indirectly serious through risk of secondary infection, prickly heat is a cause of widespread distress. Generally considered in the States to be a mild malady peculiar to babies, on the Persian Gulf it becomes an angry rash which can cover practically the entire body and become unbearably irritating. Though no specific treatment has been discovered, removal to temperate surroundings causes the rash to disappear rapidly. As a consequence, extreme cases are either placed in an air-conditioned ward, or evacuated to a mountain rest camp.

All in all, life for the American soldier in the Persian Gulf region is far from pleasant, and working there a continuous effort. But wisely cared for, he is taking it and getting the job done.

(This article, here printed in shortened form, was written especially for "Civil Engineering" by Major Fortson, and forwarded to us through his wife.)

New District of Columbia Section

AT THE TIME of the Annual Meeting a year ago it was decided by the Board of Direction that beginning in 1944 the boundaries of the Districts and Zones into which the membership is divided for the purpose of electing Society officers should be defined in terms of Local Section areas.

At the meeting of the Board at the time of the recent Annual Meeting, according to the provisions of the Constitution, the Board made announcement of the Districts and Zones for the coming year. This involved one change in District boundaries, to establish the area of the District of Columbia Section as a District by itself, No. 5.

Because of the continuing growth of Society membership in that area the Committee on Districts and Zones recommended:

> "That the Local Section areas of Maryland and Virginia shall be added to District 6 to constitute a new District 6 and that the Local Section area of the District of Columbia shall be constituted as District 5."

This was the only change in Districts and Zones recommended. On adoption by the Board, the new setup was inaugurated, to be in force immediately.

E. Lawrence Chandler Becomes Society's Washington Representative

ON MARCH 1, E. Lawrence Chandler, M. Am. Soc. C.E., took up active duties as representative of the Society in charge of its Washington, D.C., office. He succeeds Hal H. Hale, M. Am. Soc. C.E., who resigned from that position as of December 31, 1943. The Washington office will continue to be located at 1026–17th St., N.W., where Mr. Chandler will be ably assisted by Miss Helen McQuaide as secretary.

Because of his long-standing membership and widespread activities, Mr. Chandler has become well known in the Society since his election as Junior in 1909. His earliest professional work was in New England, in sewerage and water-supply work at New London and Groton, Conn., and Providence, R.I. There followed five years with the Miami Conservancy District, which he served as assistant division engineer and division engineer. This work began his connection with heavy construction activities, which has continued without intermission. For the following twelve years he was engineer and superintendent of construction in contracting work for Price Brothers Company of Dayton, Ohio. Power installations, both steam and hydroelectric, engaged his efforts in Indiana, Michigan, Texas, and elsewhere in the Midwest.

E. LAWRENCE CHANDLER, M. AM. SOC. C.E.

This experience led to his appointment, in 1935, as chief engineer of the Chattanooga Flood Protection District, which he has served intermittently since then, interspersing this work with $2^1/_2$ years in estimating and design for the Tennessee Valley Authority and a period as chief construction engineer of the Pensacola Dam in Oklahoma. In 1941 he joined the organization of Charles T. Main, Inc., for whom he spent the past two years as project manager in charge of the construction of a large shipyard in Wilmington, Del., and in engineering investigations in Latin America.

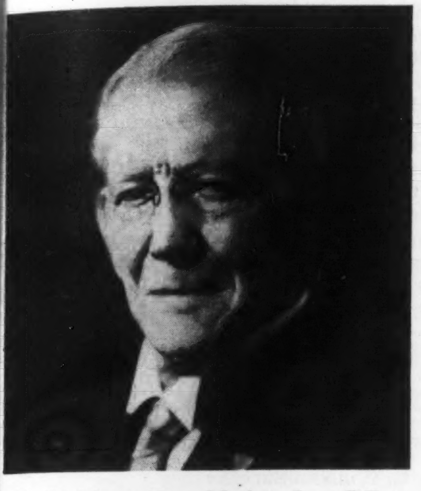
In spite of the frequent moves that have attended his construction work, Mr. Chandler has always been much interested in the Society. In 1919 he was advanced to Associate Member, and in 1922 to Member. He has contributed articles to CIVIL ENGINEERING and discussion to PROCEEDINGS. A term as vice-president of the Tennessee Valley Section was interrupted by his war work.

In addition to his wide practical experience, Mr. Chandler has good technical ability, an engaging personality, and a natural enthusiasm for those ideals which are representative of the Society. He is a graduate of Brown University in the class of 1909. His married son, an engineering graduate of the University of Tennessee, is employed by an industrial firm in Chattanooga. Mr. and Mrs. Chandler will make their home in Washington or its environs.

Officers and members of the Society who have occasion to meet him in his work in Washington or to call upon him for assistance, will find that the Society is well represented. His appointment ensures that the high character, usefulness, and efficiency of that office will be continued.

Two New Honorary Memberships for Dr. Mead

To the long list of honors previously accorded Dr. D. W. Mead, have recently been added honorary memberships in the Western Society of Engineers and the Engineering Institute of Canada. That of the Western Society of Engineers will be presented at its meeting in Chicago in April. Dr. Mead has long been a member of that organization.



D. W. Mead, Hon. M. Am. Soc. C.E.

The Annual Meeting of the Engineering Institute of Canada was held in Quebec on February 10–12. A number of well-known engineers attended from the United States; the Society was represented by President Pirnie and Secretary Seabury. In awarding this honorary membership, President K. M. Cameron of the Institute referred to Dr. Mead as "Dean of Engineering of North America." In his brief response, Dr. Mead touched on a subject that has been so near to him through many years, the critical need of inculcating young men entering the profession with engineering traditions and ideals.

Dr. Mead was made an Honorary Member of the Society in 1931 and served as President in 1936.

Work of Membership Qualifications Committee

One of the most extensive and most important branches of work in the Society is that dealing with applications for membership admission and transfer. Because this work is largely administrative, and involves a multiplicity of details, it is apt to escape the notice of the ordinary member. The opposite should be true—the Society's policies with respect to its membership, and the successful administration of these policies, constitute an important factor in the general advancement of the profession.

The work itself never ends. A sizable department in the Headquarters office is engaged solely in processing the various applications. Some of these are handled through a semi-automatic procedure, involving member sponsors, local membership committees, present and former employers, faculty advisers, and other references. A large part of the staff work is in the preparation of details for the Board Committee on Membership Qualifications which, in the last analysis, forms a screen through which the difficult cases pass to the scrutiny of the Board of Direction itself. Some of the problems of this committee are illustrated in its annual report, just submitted to the Board.

A Busy Year

During 1943, this committee passed on 1,888 applications for admission and transfer, which was 52 less than the number reviewed in the year 1942, but well above the record of other recent years. Of the cases considered, 389 were applications for Member, 495 for Associate Member, 1,001 for Junior, and 3 for Affiliate grade. Says the report:

"Applications for Member have definitely increased in 1942 and 1943. This is no doubt a reflection of the improved financial position of engineers, with fewer of the older men going into the armed forces. Applications for Associate Member have decreased. Very many in this classification have entered the armed forces. The Junior applications have dropped off less than might be anticipated, due no doubt to the inducement coming from remission of dues. It may be predicted, however, that Junior applications will fall off very greatly in the coming year with few engineering students pursuing the regular courses and participating in Student Chapter activities.

"The number of cases considered by the Committee in any given year is always in excess of the new applications for original membership or transfer of grade. There are always holdover cases from the first, or even the second, preceding year. There are also many cases on which final action is deferred."

Of the 1,888 applications in 1943, there were 1,474 that eventuated as clear cases that could be solved through the semi-automatic process. Other regular procedures solved additional cases, so that the remainder of the screening processes left only 358 cases to be analyzed extensively by the Committee. Lengthy consideration for eight to ten hours on the day preceding each of the four meetings of the Board, solved most of the cases before the Committee, with the result that less than 50 out of the whole number had to be brought before the Board. With respect to only two cases during 1943 was the Committee in serious doubt, presenting them without recommendation. In all other instances the Board supported the Committee's recommendations.

How Former Members Are Reinstated

During the year one membership procedure, adopted by the Board at its January 1942 meeting upon the recommendation of the previous year's Committee, was put into effective operation. This concerned the method of handling the applications for reinstatement of former members. The revised operation is as follows:

"Those who apply for readmission to the Society, in the same grade as held formerly, but who have been separated from the Society for more than one year, will be asked to submit a professional record covering the interim period and to name three Corporate Members who have knowledge of what the applicants have been doing since the date of separation from the Society. Reports will be requested from the Corporate Members named and from the Local Membership Committee which seems likely to have the most knowledge. Interview by the Local Membership Committee will not be required, but expression of opinion of suitability will be requested as from personal knowledge or by inquiry. The information received from three Corporate Members and the Local Membership Committee will be sent to the members of the Membership Qualifications Committee. If four favorable replies from members of the Membership Qualifications Committee are received, and no unfavorable reply is received, the applicant will be considered readmitted and will be so notified."

While taking no credit for originating this plan, the 1943 Committee has put it into effect. The result has been that 21 former members have been placed on the rolls again with a minimum of delay, yet with reasonably careful scrutiny.

Problems for Future Committees

The Committee's report concludes with the following observations:

"In ordinary times the young engineer is graduated after pursuing standardized courses of study, and then passes through a more or less orderly succession of engagements, gaining with each in experience, salary remuneration, and qualifications for further advancement. However, the past ten or twelve years have not in any way been 'ordinary times.' The depression years, followed by the great war, have made the professional development of many, perhaps most, engineers anything but orderly and consistent. Some men, through no fault of their own, have received setbacks from which they have never recovered. Others, through political fortune connected with newly created government agencies, or through the inflated projects of the war period, have fallen luckily into responsibilities and salary classifications unwarranted by their real experience and ability.

"These abnormal conditions will place a heavy obligation on future Committees on Membership Qualifications. If the Society is to maintain its present high membership standard, all future applications must have unusually careful scrutiny. The mere fact that an applicant shows responsible charge of a million-dollar undertaking is not sufficient evidence of qualifications. Did he actually conceive, design or construct, or did he merely sign papers? Did he achieve this responsibility on the strength of his past record, or did he fall into the job because there were no really qualified engineers available? Committee members must in some measure constitute themselves detectives, to ferret out the facts and look behind the face of the applicant's record. They must lean heavily upon the reports of Local Membership Committees, and here the Directors can help by selecting efficient and conscientious members for the local committees.

"One other problem to be faced by future Local Membership Committees is a possible confusion in the standards of engineering education. We now have in our engineering colleges many thousand young men who are pursuing irregular courses, with the primary objective of training soldiers or sailors. Some of these compare favorably with peacetime courses, but some do not. While these young men deserve the maximum of consideration, the standards of membership must not be broken down by recognition promiscuously of these non-degree courses."

The 1943 Committee, from whose annual report the foregoing quotations have been drawn, consisted of Directors V. T. Boughton, Charles B. Breed, William D. Dickinson, Dean G. Edwards, George B. Massey, and John W. Cunningham, chairman.

Appointments of Society Representatives

RALPH M. BERRY, Assoc. M. Am. Soc. C.E., represented the Society at the inauguration of Dr. Patrick Joseph McCormick as rector of the Catholic University of America at ceremonies held in Washington, D.C., on November 9, 1943.

W. WATTERS PAGON, M. Am. Soc. C.E., has been appointed to represent the Society on the executive committee of the Joint Committee on the National Capital, which is composed of the chairmen of similar committees of other interested national associations.

News of Local Sections

Scheduled Meetings

BUFFALO SECTION—Lecture meeting on March 28, at 8 p.m.

CINCINNATI SECTION—Joint meeting of all societies of the Technical and Scientific Council of Cincinnati in the Taft Auditorium on March 2, at 8 p.m.

CLEVELAND SECTION—Dinner meeting at the Cleveland Engineering Society on March 10, at 6:30 p.m.

LEHIGH VALLEY SECTION—Meeting at Lehigh University on March 13, at 8 p.m.

LOS ANGELES SECTION—Dinner meeting at the University Club on March 8, at 6:45 p.m.

METROPOLITAN SECTION—Technical meeting in the Engineering Societies Building on March 15, at 8 p.m.

MIAMI SECTION—Dinner meeting at the Royal Center Restaurant on March 2, at 7 p.m.

NORTHEASTERN SECTION—Dinner meeting at the Engineers Club on March 27, at 6 p.m.

NORTHWESTERN SECTION—Dinner meeting at the Campus Club on March 6, at 6:30 p.m.

PHILADELPHIA SECTION—Dinner and meeting at the Engineers' Club on March 14, at 6 p.m.; meeting at 7:30 p.m.

SACRAMENTO SECTION—Regular luncheon meetings at the Elks Club every Tuesday at 12 m.

SAN DIEGO SECTION—Dinner meeting at the U.S. Grant Hotel on March 23, at 6:30 p.m.

SAN FRANCISCO SECTION—Dinner meeting of the Junior Forum at the Engineers' Club on March 30, at 6:15 p.m.

TENNESSEE VALLEY SECTION—Dinner meeting of the Knoxville Sub-Section at the S and W Cafeteria on March 14, at 5:45 p.m.

TEXAS SECTION—Luncheon meeting of the Dallas Branch at the Adolphus Hotel on March 6, at 12:15 p.m. (luncheon meetings of the Dallas Branch are held at the Y.M.C.A. the first Monday of each month at 12:15 p.m.); luncheon meeting of the Fort Worth Branch at the Blackstone Hotel on March 13, at 12:15 p.m.; and annual business meeting of the Houston Branch at the Houston Engineers' Club on March 7, at 8 p.m.

TRI-CITY SECTION—Dinner meeting at the Fort Armstrong Hotel on March 2, at 6:30 p.m.

Recent Activities

CENTRAL ILLINOIS SECTION

On January 13 the Central Illinois Section held a joint dinner meeting with the University of Illinois Student Chapter. A talk on "Armor-Piercing Projectiles"—given by Harold L. Walker, head of the department of mining and metallurgical engineering at the University of Illinois—was the speaker of the evening. Professor Walker described the various types of projectiles being used in the war—from the 30-caliber, the smallest, to the 16-in. shell, the largest. He had with him samples of the shells that were light enough to carry around.

CENTRAL OHIO SECTION

The speaker at the January meeting of the Central Ohio Section—held at Ohio State University on the 19th—was Dr. Jonathan Forman, of the "Friends of the Land Society." Dr. Forman discussed the relationship of top-soil minerals to the health of the nation and emphasized the necessity of reducing the extravagant losses of top soil in this country.

CINCINNATI SECTION

"The Art of Photography" was the topic of discussion at the January 18th meeting of the Section, the speaker being F. L. Cavally. The subject was amply illustrated by a large exhibit of photographs that Mr. Cavally had made. A discussion on collective bargaining preceded the technical session.

CLEVELAND SECTION

At the annual meeting of the Section, which took place on January 14, the following officers were elected for 1944: Mark Swisher, president; Otto F. McConnell, vice-president; and Arthur H. Stark, secretary-treasurer. In a talk entitled "Human Reserves," David Keith Stewart commented interestingly on the traits that enable certain persons to triumph over their misfortunes and attain success despite seemingly overwhelming obstacles. Mr. Stewart is assistant manager of the savings department of the Central National Bank. During the course of the meeting certificates of life membership in the Society were presented to five members of the Section.

DAYTON SECTION

On January 17 members of the Dayton Section had as their speaker O. L. Cunningham, of the Montgomery County Agriculture Service. Mr. Cunningham, whose subject was soil conservation, pointed out that the top 8 in. of soil feed the world, and that this layer of soil has been unnecessarily wasted in the past. It takes 500 years to make one inch of fertile soil. Ways and means of conserving the top soil and protecting it for future generations were then discussed.

ITHACA SECTION

At the November meeting of the Ithaca Section, which was held on the Cornell campus on the 22d, sanitary engineering problems were discussed. The first speaker on the program was George D. Carpenter, superintendent of the water and sewer department of Ithaca, who discussed the city's water and sewer problems. He was followed by Charles L. Walker, professor of sanitary engineering at Cornell University, who reviewed postwar sanitary engineering trends. For the December meeting the Section was one of the participating groups in a joint engineers' dinner meeting held at Elmira, N.Y. Dean Emeritus Dexter S. Kimball addressed the gathering on the topic, "The Future of Engineering and Engineering Education."

KENTUCKY SECTION

On January 21 the Section sponsored the annual joint luncheon meeting with the Kentucky Society of Professional Engineers at Lexington. The meeting was called to order by M. J. McGruder, president of the Kentucky Society of Professional Engineers, who turned the meeting over to W. S. Todd, president of the Kentucky

Section. The speaker of the occasion was J. S. Watkins, Commissioner of Highways of the Commonwealth of Kentucky. In his talk, which was entitled "Postwar Plans for Kentucky Highways," Mr. Watkins described the proposed allocation of federal and local funds for future expansion.

The second meeting of the newly organized Junior Forum of the Section was held in the Seagram Company's Auditorium in Louisville on January 10. J. R. Stuetz, director of technical information for the company, gave an illustrated lecture on the manufacture of industrial alcohol, describing the various phases in the evolution of alcohol making. Following his lecture, a model of a modern distillery was exhibited.

LOS ANGELES SECTION

The Fontana steel mill was the subject of discussion at the January meeting, the principal speaker being Frank Backman. Mr. Backman, who is general superintendent of the Kaiser Company's iron and steel mill at Fontana, discussed the reasons for the selection of Fontana for the plant site and described the many difficulties encountered in obtaining essential equipment in time to meet the construction schedule. The plant now has a daily output of more than 1,000 tons of cast iron, 1,600 tons of steel, and 800 tons of plate. A number of Mr. Backman's associates on the project attended the meeting.

LOUISIANA SECTION

At the December meeting of the Louisiana Section, which took place in New Orleans on the 7th, the guest of honor and speaker was Howard F. Peckworth, assistant to the Secretary. Mr. Peckworth, who had been invited to address the group on collective bargaining, outlined the events that led to the Board of Direction's recommendation on collective bargaining. A general discussion from the floor concluded the technical program.

METROPOLITAN SECTION

The subject, "Army Construction Engineers in the Persian Corridor," was discussed by Col. Carlton S. Proctor at the January meeting of the Section. Colonel Proctor—a member of the New York City consulting firm of Moran, Proctor, Freeman and Mueser, who has been serving in the Corps of Engineers—organized and trained the 334th Engineer Special Service Regiment. This regiment was among the first contingents of troops to arrive in Iran early in the fall of 1942. It took over construction activities in the Persian Corridor and played an important part in the establishment of facilities essential to the supply of war materials to Russia. There was a capacity attendance of about 400.

MICHIGAN SECTION

The Michigan Section has announced that the general theme of its 1944 meetings will be postwar planning and collective bargaining. The principal speaker at its December meeting was John P. McElroy, personnel officer for the Wayne County Road Commission. Mr. McElroy compared recent advances in income received by professional engineers on the Wayne County Road Commission with those received by skilled and unskilled workmen in the employ of the Commission. He stated that, since 1940, the latter group have received wage increases that average 50%, with one group receiving an increase of 81%. In the meantime, however, the professional engineers in the same organization have had their salaries raised 15%.

NEW MEXICO SECTION

The presentation of two films—by William Cheek, district manager of the Portland Cement Association—comprised part of the technical program at the January 11 meeting of the Section, which took place in Santa Fe. One of these, entitled "Limited Ways," showed the new limited access highways, while the other depicted the construction of airport runways. Aaron Abelard, of the New Mexico Planning Board, then discussed the problem of rural highways in New Mexico and suggested some possible solutions.

PHILADELPHIA SECTION

On December 14 the Section met, first for dinner and a brief business session at the Engineers' Club, and then adjourned to the Edison Building to meet with the Philadelphia section of the American Society of Mechanical Engineers. During the business meeting collective bargaining was discussed, and Society Secretary George T. Seabury presented certificates of life membership in the Society to five members of the Section. The combined group of engineers then heard Comdr. Richard Conn, director of the Naval Air Experimental Station at the Philadelphia Navy Yard, speak on "Experimental Aviation—Seeds of Thought." Commander Conn stated that in the future aviation will operate at the level known as the "troposphere," as this is the only place where time schedules can be maintained. Many problems must be solved for operation in the troposphere he said, and many people outside the field of aviation are working on the solution of these problems. Doctors, for instance, have developed the "bends bag" and the "oximeter." A few remarks from representatives of the various aircraft factories present concluded the technical program.

PROVIDENCE SECTION

The principal speaker at the January 27 meeting of the Providence Section was W. O. Hiltabidle, captain, Civil Engineering Corps, U.S. Navy. Captain Hiltabidle, who was stationed at Pearl Harbor at the time of the Japanese attack, gave a vivid description of his experiences there. He also described the work of the Seabees. Guests of honor included four other Naval officers who were on duty at Pearl Harbor in December 1941; Lt. Col. S. G. Neff, U.S. Corps of Engineers; and C. B. Breed, Director of the Society. The latter presented a certificate of life membership in the Society to Leon L. Holland.

ROCHESTER SECTION

Two joint meetings constituted the January activities of the Rochester Section. The first of these—held on the 13th in conjunction with a meeting of the Rochester Engineering Society—featured a talk by Richard D. Fine, chief of the Protective Construction Unit of the National Office of Civil Defense. Mr. Fine gave an illustrated talk on the effects of high explosive bombs on buildings and structures. At the request of the War Production Board, the Section held a joint meeting with the Rochester section of the American Society of Mechanical Engineers on the 20th. The speaker of the evening was Lt. Col. Paul H. Downing, of the Army Air Force, whose subject was "War Production Under Present Manpower Conditions." Afterwards the meeting continued in three different discussion groups, one of which was sponsored by the Rochester Section.

SACRAMENTO SECTION

The annual dinner dance and two regular luncheon meetings for the annual reports and election of officers filled the schedule for the first half of January. On the 20th, the Pacific Gas and Electric Company presented two technical movies. On the 27th, Everett A. Pesonen, of the National Park Service, discussed "The Place of Recreation in Multiple-Use Projects," demonstrating the need for recreation engineering now functioning as a part of the Central Valley Project.

ST. LOUIS SECTION

On January 24 members of the Section heard W. F. Wessel, district safety engineer for the St. Louis district of the U.S. Engineer Office, give a short talk on the work of the U.S. Engineer Department in educating industry in practices of safety. The presentation of two sound films, showing the right and wrong methods of introducing a new employee to his job, concluded the technical program.

SOUTH CAROLINA SECTION

The annual meeting of the Section, which was held in Columbia on January 12, took the form of a joint luncheon and technical session with the South Carolina Society of Engineers. The list of speakers included Dr. R. F. Poole, president of Clemson College; E. P. Miller, relay engineer for the South Carolina Electric and Gas Company; and Frederick H. McDonald, Charleston consultant. During the annual business meeting, also held at this time, J. S. Williamson was elected president for one year. The other officers' terms do not expire until 1945.

TRI-CITY SECTION

The Tri-City Section held its January meeting at Moline, Ill., on the 14th. Following a brief report on the work of the Postwar Planning Committee—given by M. C. Loring, president of the Section—the speaker of the evening was introduced. This was C. H. Burgston, metallurgist of Deere and Company, of Moline, Ill., who gave an illustrated talk on "Heat Treatment of Steel."

ITEMS OF INTEREST

About Engineers and Engineering

Importance of the Humanities in an Engineering Education

By Gano Dunn, M. Am. Soc. C.E.

President, J. G. White Engineering Corporation, New York, N.Y.

This contribution toward a better understanding of the engineer's professional and social stature is published through the cooperation of the Committee on Professional Recognition of the Engineers' Council for Professional Development.

If the engineer's training neglects the great mirrors of humanity, history, and languages, particularly his own language; if his mind and heart are not sensible to the great social forces of his day and his community; if he but feebly develops the subtle qualities of character that make for personality, his career as an engineer is limited, no matter how much science he may know.

I believe this more firmly now than when I first said it, in a commencement address a number of years ago. In the meantime, as the engineering profession has developed, the center of education for engineers has been shifting more toward the humanities, and several of our leading engineering schools have established departments in the humanities.

In earlier days, humanistic studies were considered not only to detract from the education of a technological specialist on account of the time diverted to a useless purpose, but to unsettle the mind of such a student through their lack of precision and the vagueness of their terms. These considerations have long since been thrown overboard, and in their place has come a realization that the study of history and of language contributes to the development of the mind of a specialist, just as mathematics does to the mind of almost everybody else. On these counts, even where intense technological specialization is intended, it is recognized that that very object will be better achieved by broader training.

There are other considerations that bear upon this matter. Not all men with an engineering education take up the practice of engineering; many are drawn off into the field of organization, and into other fields in which the engineering method of approach to problems, and the engineering point of view, introduce fermenting leaven into the processes of industrial business procedure.

Partly for this and partly for other reasons, engineering has become the cornerstone of industry, and the function of management has fallen largely to the engineer. In the field of management, which involves the play of the human spirit at its best and at its worst; and particularly in labor relations, where generosity, loyalty, and independence are manifest, as well as passion, ignorance, and vanity, the engineer's capacity for organization, leadership, and sympathy with human problems gives rare opportunities.

For all these reasons, the engineer whose training has been solely technical is at a loss in competing with one whose training has been broader, in technical as well as in other fields. He is at a loss because he is less able to make his views prevail, less able to persuade and to contend.

It is a satisfaction to see that the Committee on Aims and Scope of Engineering Education has declared that, along with the scientific-technical stem of an engineer's education, should go an equally important humanistic-social one. It has stated that the aims of an engineering education should include an understanding of the evolution of the social organization within which we live and of the influence of science and engineering on its development; also an acquaintance with some of the great masterpieces of literature and art, and an understanding of their setting in, and influence upon, civilization.

Faith of the Engineer

I am an Engineer. In my profession I take deep pride, but without vainglory; to it I owe solemn obligations that I am eager to fulfill.

As an Engineer, I will participate in none but honest enterprise. To him that has engaged my services, as employer or client, I will give the utmost of performance and fidelity.

When needed, my skill and knowledge shall be given without reservation for the public good. From special capacity springs the obligation to use it well in the service of humanity; and I accept the challenge that this implies.

Jealous of the high repute of my calling, I will strive to protect the interests and the good name of any engineer that I know to be deserving; but I will not shrink, should duty dictate, from disclosing the truth regarding anyone that, by unscrupulous act, has shown himself unworthy of the profession.

Since the Age of Stone, human progress has been conditioned by the genius of my professional forebears. By them have been rendered usable to mankind Nature's vast resources of material and energy. By them have been vitalized and turned to practical account the principles of science and the revelations of technology. Except for this heritage of accumulated experience, my efforts would be feeble. I dedicate myself to the dissemination of engineering knowledge, and, especially, to the instruction of younger members of my profession in all its arts and traditions.

To my fellows I pledge, in the same full measure I ask of them, integrity and fair dealing, tolerance and respect, and devotion to the standards and the dignity of our profession; with the consciousness, always, that our special expertness carries with it the obligation to serve humanity with complete sincerity.

A. B. Parsons

Origin of Weights and Measures

Engineers interested in the adoption of the metric system for their own work will be glad to know of efforts toward a similar end in other fields. One such is the great profession of medicine. The Council on Pharmacy and Chemistry of the American Medical Association has issued a report urging adoption of the change in that one large field. Already it is making considerable progress toward this end.

Of special interest to engineers will be the summation in the recent report of the Council as given in *The Journal of the American Medical Association* for December 4, 1943. The background of present usage is developed, from which account the following paragraphs may serve as a reminder to engineers:

"The traditional system of measures and weights (later codified as the imperial or foot-pound-second system) and the centimeter-gram-second systems afford an entertaining contrast. Each system is based on units of length, mass, and time. The traditional measures are ancient in origin and historically have been derived from anatomic structures or articles of common use. The foot was originally the length of any one's foot, regardless of size and style of shoe. This very variable measure prevailed until Edward II (A.D. 1324) decreed that 'three barley corns, round and dry, shall make an inch, twelve inches a foot, three feet a yard.' In recognition of the need for uniformity, it was decreed that the barley corns must be taken from the center of the ear and placed end to end.

"Other units of length were the cubit, or the length of the forearm; this was used in ancient Egyptian, Hebrew, and Roman mensuration; the yard, which Henry I is said to have decreed should equal the distance from the point of the kingly nose to the end of the regal thumb; the rod, which was defined as the 'combined length of the left feet of sixteen men when lined up heel to toe as they left church on a Sunday morning.'

"Bulk was first measured by the armful, the handful, and the pinch, the latter also being known as the pugil and, according to a footnote in a 1793 edition of Wesley's Primitive Physik, consisting of 'as much as you can take between your thumb and two forefingers.'

"When clearer standardization of bulk measurement came it was based first on cereals (whence we get our present method of estimating weight by grains) and later on coinage, as illustrated by the pound—in England both a weight and a money and established thus in 1266:

"'An English penny, called a sterling, round, and without clipping, shall weigh thirty-two corns from the midst of the ear, and twenty pence shall make an ounce, and twelve ounces one pound, and eight pounds do make a gallon of wine, and eight gallons of wine do make a London bushel, which is the eighth part of a quarter.'

"A standard yard has of course been preserved as a basic measure; however, since the time of Henry VII and Elizabeth, the Imperial Standard Pound is preserved as a standard of mass and there is a standard gallon as a corresponding measure of volume. The unit of time is fortunately the same in the imperial and the metric systems."

Pan American Highway Cutting Through South America

The Office of the Coordinator of Inter American Affairs reports that with the completion of construction on gaps in Colombia and Ecuador, there will be available for continuous motor travel some 10,000 miles of the Pan American Highway system. When the road building in progress in these two countries is finished, motorists will be able for the first time to drive all the way from the Gulf of Darien in Northeastern Colombia to Buenos Aires along the Pan American Highway route. Actually the entire length of South America will be available for continuous motor travel because highways already are open south of Buenos Aires to the Straits of Magellan.

The major gaps remaining in the Pan American route from northern Colombia to Buenos Aires are in Ecuador. The three sections in Ecuador under construction total about 235 miles. The remaining 437 miles of the projected 672-mile route are finished.

In Colombia, a 76-mile connecting road remains to be finished between Turbo and Pavarandicito, northern terminus of the Pan American Highway in South America, before motorists can reach the Pan American Highway from the Gulf of Darien on the border of Panama. Access to the Pan American Highway is expected to be over this connecting road for some years because the projected route through the unexplored jungle of Southern Panama remains to be surveyed.

From the Peruvian-Ecuadoran border, the Pan Ameriacn Highway is open to continuous motor travel, without detours or ferrying, through Peru and Chile to Buenos Aires in Argentina.

N. G. Neare's Column

Conducted by

R. Robinson Rowe, M. Am. Soc. C.E.

"Numbers, gentlemen, can be your tools or your toys. For many of us, they are both, the toy teaching us less tedious use of the tool. Tonite they are toys in a game to build the number 1944 (literally mcmxliv) with as few like digits as possible—particularly with the digits 3, 4, 5, and 9. You may use all the algebraic operators you wish to hold the digits together. Who'll play with me?"

"I'll sit in for one round, Professor," offered Joe Kerr. "Four 3's will do the trick in a way that suggests a solution with three 9's, thus:

$$3 \times 3(3!)^3 = 1944 = 9(\sqrt{9}!)^{\sqrt{9}}$$

But I couldn't hit the mark with less than five 4's or 5's."

"I found the trick for four 4's," added Titus Wadhouse. "Since zero as an exponent is an operator, we can write:

$$4!(4 - 4^0)^4 = 1944."$$

"I'm afraid that definition would break up the game," protested Professor Neare.

"I suspect," said Cal Klater, "that the missing operator is the symbol for the recurring decimal. There's nothing else like it in monodigital calculus. Here's how:

$$\frac{\left(\frac{4!}{4}\right)^4}{\sqrt{.\dot{4}}} = 1944 = \frac{5 \times 5!}{.\dot{5} \times .\dot{5}}$$

(Note: Dot over numeral indicates that same numeral recurs 6 times at right of decimal point.)

"Splendid, Cal! Personally I prefer a 2-story building of 4's instead of your 3-decker, and I have a symmetrical castle of seven 11's to complete the picture, viz.:

$$4!\sqrt{\left(\frac{4}{.\dot{4}}\right)^4} = 1944 = \frac{11 + \frac{11 + 11}{11} + 11}{.\dot{1}\dot{1} \times .\dot{1}\dot{1}}$$

"For a new problem, I am indebted again to my foreign correspondent, Alenfer de l'Axe, who has just returned from a thrilling assignment in the South Pacific. He was aboard the U.S.S. *Sidewinder* when it was straddled with three near misses— two on the port side, fore and aft respectively, and one to starboard amidships. The torque of these simultaneous blows bent the *Sidewinder* so that its keel had a 15-ft middle ordinate and steering became a problem. The drift to starboard was so great that she couldn't sail a straight course.

"Dodging bomber attacks, the skipper found that he turned in a 25-mile-diameter circle with full left rudder and in a 1-mile-diameter circle with full right rudder. He didn't dare stop for a jury rig, but headed on a sidewinder course at 30 knots for a port 250 miles away. How long did it take him to run in?"

[Only one Cal Klater this month—Richard Jenney, although many sent in the solutions with 3's and 9's only. Two solutions of earlier problems were so delayed by the mails that acknowledgment is in order at this late date: John F. Miller found 140.1 cu ft for last September's problem by a geometrical approximation and G. H. Wilsey used an elaborate integration by series to compute 48.2317566 cu ft for the November sequel.]

Legislation to Regulate Disposal of Surplus Government Materials

Of interest to engineers will be the Surplus Property Act, sponsored jointly by representatives Wright Patman and Charles A. Halleck. This act is the recommended enactment of the House Small Business Committee, one of half a dozen Congressional committees which have been wrestling with the problem of disposing of the government's accumulated excess materials and equipment and the far greater excess that will emerge after the war. Congressmen Patman and Halleck are seeking a twofold result: (1) a uniform procedure for disposition of all surplus under one central agency, and (2) to channel back through normal trade routes as great an amount of the surplus as possible.

Under the proposed bill, the Reconstruction Finance Corporation would appoint an advisory committee for each class of property which is to be sold or leased. These committees would advise on price, time, method, and manner of disposing for each class of property. As summarized by the Surplus Record, the RFC would be governed by the following considerations:

1. Distribution of such property should be through established trade channels.
2. The acquisition of large quantities of such property for speculative purposes should not be permitted.
3. The prices at which any particular property or class of property is sold or leased should be uniform.
4. Such property should be sold or leased at prices high enough to enable the government to secure a fair return.
5. The sale or lease of such property should be at a rate which will not unduly disrupt trade and commerce.
6. The welfare of small business enterprises should be considered whenever possible.

At least two other legislative acts have been presented in recent months to Congress, both of which have a bearing on the disposition of government-owned surplus property. Action is pending on both. H.R. 2795 amends the Budget Act to provide for the sale of surplus property by government departments and agencies; creates a Surplus War Property Committee to investigate war surplus materials and property and recommend legislation for its orderly disposal. This act was introduced by Representative O'Leary; and passed by the House on June 9, 1943. Hearings held in the Senate.

The other of these acts—S. 1609—creates a policy-making commission to dispose of an estimated 300,000 government-owned machine tools; provides priorities in distribution for re-tooling government navy yards and arsenals and for aiding small business (returning war veterans in particular); provides free machine tools for public school programs, and so forth. Authority of act would terminate three years after end of present war when full report of activities would be made to President and Congress, and remaining machine tools broken up as scrap by, and at the expense of, the departments and agencies of the government. Introduced by Senator Murray, and referred to the Senate Military Affairs Committee.

NEWS OF ENGINEERS

Personal Items About Society Members

Ben Moreell, rear admiral, Civil Engineering Corps, U.S. Navy, has received President Roosevelt's nomination for promotion to the rank of vice-admiral, subject to confirmation by the Senate. Admiral Moreell, who has been chief of the Bureau of Yards and Docks since 1937, is an Honorary Member of the Society.

Orville W. Crowley has resigned as executive secretary of the Central Branch of the Associated General Contractors of America at Des Moines, Iowa, in order to serve as project manager on the maintenance of the northern section of the Alaska Highway. Mr. Crowley, who has been connected with the Associated General Contractors of America for over twenty years, has been on leave of absence from the organization for the past two years while serving as construction manager for the Lytle-Green Construction Company on the building of the highway.

C. W. Mengel is supervising engineer for the W. C. Olsen Company, of Raleigh, N.C., on the construction of facilities for the municipal water supply of Wilmington, N.C. He was formerly director of public works and services for the city of Greensboro, N.C.

Arthur Tauscher, captain, Corps of Engineers, U.S. Army, was awarded the Silver Star Medal for gallantry in action in the Sicilian invasion. At present he is serving as company commander in the Italian campaign. His rank of captain represents a recent promotion from that of first lieutenant.

Francis B. Marsh, formerly division engineer for the New York City Board of Water Supply at White Plains, N.Y., is now associate engineer for *Water Works Engineering*, with offices in New York.

Guy Kelcey has severed his connection with the Office of Defense Transportation—he was regional director of the Division of Local Transport for the Southeastern States, with headquarters in Atlanta—in order to accept the position of highway analyst for the Port of New York Authority.

Frederick W. La Forge, retired engineer of New London, Conn., and a charter member of the Connecticut Society of Civil Engineers, was a recipient on January 15 of a testimonial letter—signed by all the members of the Board—and a war bond in celebration of his sixty years of membership in that organization. Mr. La Forge has been a member of the Society for forty years.

Emil A. Verpillot has been promoted from the rank of lieutenant commander in the Civil Engineering Corps of the U.S. Naval Reserve to that of commander. He is in the Alaska division of the Bureau of Yards and Docks, with headquarters at Seattle, Wash.

James L. Leggett, Jr., second lieutenant, Corps of Engineers, U.S. Army, is reported to be a prisoner of war in Zentzuji Prison Camp, Island of Shikoku, Japan.

James H. Herron, Cleveland (Ohio) consultant and president of the James H. Herron Company, received the honorary degree of doctor of engineering from the Case School of Applied Science on December 20.

Kenneth F. Park recently resigned as chief field engineer for R. G. Le Tourneau, Inc., of Peoria, Ill., in order to become manager of the sales development division of the Caterpillar Tractor Company, also at Peoria.

Benjamin F. Vandervoort, colonel, Corps of Engineers, U.S. Army, who was retired in October 1943, has been recalled to active duty and again occupies his former post as chief of the Price Adjustment Section, Ohio River Division, Engineer's Office, Columbus, Ohio. Colonel Vandervoort recently received the Legion of Merit decoration in recognition of his previous duty as zone constructing quartermaster at Columbus and as chief of the Price Adjustment Section.

Edward W. Roemer, of Wellesley Hills, Mass., has been appointed executive director of the Associated General Contractors of Massachusetts. Mr. Roemer was formerly New England manager for James Stewart and Company, of New York.

Paul W. Thompson, colonel, Corps of of Engineers, U.S. Army, has been in England for some months where he is invasion training officer for our troops in the British Isles. As commanding officer of the great assault training center, which was built under his direction, Colonel Thompson is in charge of training both Infantry and Engineer contingents. Before leaving for overseas duty, he was executive officer in charge of troops to Brig. Gen. C. L. Sturdevant, Assistant Chief of Engineers.

Frederic G. Healy, assistant state highway engineer for New Mexico, was recently named acting state highway engineer.

Harold E. Wessman, chairman of the department of civil engineering at New York University, was elected president of the American Institute of Consulting Engineers at the annual meeting of the governing council of the Institute. Three new members, elected to the council at the same time, are members of the Society—**E. Rowland Hill**, **Lt. Col. Enoch R. Needles**, and **Col. Carlton S. Proctor**.

Clark Kittrell, colonel, Corps of Engineers, U.S. Army, has been transferred from the Middle Atlantic Division of the U.S. Engineer Office to Chicago, where he is division engineer for the Great Lakes Division.

A. C. Polk and **Harry Hendon** have, with Hugh A. Powell, formed an engineering partnership in Birmingham, Ala. The firm will engage in general engineering work, water supply, sewage and industrial projects, plant design, and appraisal work.

Clarence E. Seage, civil engineer for the San Francisco–Oakland Bay Bridge at San Francisco, has been elected president of the Structural Engineers Association of Northern California.

George W. Rathjens, lieutenant colonel, Corps of Engineers, U.S. Army, has been named chairman of the Price Adjustment Section of the North Atlantic Division of the Corps of Engineers. Before entering the service, Colonel Rathjens was chief consulting engineer for the U.S. Smelting, Refining and Mining Company at Salt Lake City, Utah.

James E. Akans has been promoted from the rank of first lieutenant in the Corps of Engineers, U.S. Army, to that of captain. He is assistant post engineer at Fort Oglethorpe, Ga.

John C. H. Lee, major general, Corps of Engineers, U.S. Army, has received General Eisenhower's appointment as deputy commander in the European Theater of Operations. Prior to the North African invasion General Lee was made chief of the Services of Supply, E.T.O., and will retain this post in addition to his new duties.

Robert Boyer Atkins is now a lieutenant commander in the Civil Engineering Corps of the U.S. Naval Reserve, the rank representing a recent promotion from that of lieutenant. Commander Atkins is stationed at Yorktown, Va.

Simon W. Freese, a member of the Fort Worth (Tex.) consulting firm of Freese and Nichols, has been commissioned a major in the Allied Military Government Service, which is in charge of the military governments in territory occupied by the Allies.

George M. Shepard, who for the past year has been on leave of absence from the St. Paul (Minn.) Department of Public

Works, has resumed his position as chief engineer of the department. During part of his absence he served as consultant on the construction of the Alaska Highway and, from October 1 to December 31, as consultant to the Metropolitan Airport Commission of Minnesota.

Carl E. Beam has been promoted from the rank of commander in the Civil Engineering Corps of the U.S. Naval Reserve to that of captain. He is stationed at the Bureau of Yards and Docks in Washington, D.C. Prior to being called to active duty—in May 1941—Captain Beam was for a number of years Assistant Secretary of the Society.

Carl W. Smedberg has been appointed assistant regional director of Region 4 of the Federal Public Housing Authority, with headquarters at Atlanta, Ga. For some years city manager of Greensboro, N.C., Mr. Smedberg has in recent months been serving in Washington as regional engineer of the water supply section, Office of War Utilities of the War Production Board.

William D. Darby, consulting engineer of West Allis, Wis. was recently appointed to the manpower utilization division of the Wisconsin Manpower Commission. His duties will include production problems.

William W. Wanamaker, colonel, Corps of Engineers, U.S. Army, has been relieved of his duties as district engineer for the Denison (Tex.) Army District and assigned to foreign service.

Robert C. Ratcliffe, formerly associate engineer for the U.S. Engineer Office at Albuquerque, N.Mex., has been appointed city engineer of Laramie, Wyo.

W. H. Kirkbride announces his retirement, on January 31, as chief engineer of the Southern Pacific Company's Pacific and Subsidiary Lines. Mr. Kirkbride has reached the railroad retirement age.

Charles B. Burdick and **Thomas H. Wiggin** have recently been elected to honorary membership in the American Water Works Association. Another member of the Society who is being honored by the Association is **Louis R. Howson**, recipient of the Diven Medal for 1943 "for his many services and valuable contributions to the adjustment of the water works field."

DECEASED

Edgar Alcander Bayley (M. '13) of Glendale, Calif., died on November 8, 1943, at the age of 66. Early in his career Mr. Bayley was engaged in railroad work. In 1917 he entered the Los Angeles Department of Public Service in the capacity of assistant engineer. Later he was assistant civil engineer in the Los Angeles Department of Water and Power, and from 1930 until his retirement in 1942 was engineer of surveys in the latter department.

Frank Joseph Boyle (Assoc. M. '42) since 1940 designer-engineer for the Allegheny County Department of Public Works, Pittsburgh, Pa., died on January 20, 1944. He was 47. After service in the first World War (1917 to 1919) Mr. Boyle was engaged in surveying work, and from 1922 to 1931 was associated with James A. Boyle in a consulting service to a number of Pennsylvania municipalities. From 1931 to 1936 he was assistant engineer in the Luzerne County (Pa.) Road and Bridge Department, and from the latter year to 1940 was, successively, construction superintendent for the WPA at Wilkes Barre and resident engineer inspector for the PWA in Washington.

John Henry Broderick (Affiliate '38) president and treasurer of the J. H. Broderick Company, Inc., of Boston, Mass., died on December 6, 1943. Mr. Broderick, who was 63, was in private practice from 1904 until his death—successively with Thomas F. Broderick and Son, J. H. Broderick Company, and (since 1921) the J. H. Broderick Company, Inc. An expert on vibration and foundations, he was in charge of the construction of numerous buildings in Boston.

Frederick Charles Carstarphen (M. '17) consulting engineer of Denver, Colo., died suddenly at his home there on January 8, 1944. Mr. Carstarphen, who was 62, had for many years maintained a consulting practice in Denver. Earlier in his career (1914 to 1923) he was chief engineer for the American Steel and Wire Company at Trenton, N.J. During this period he did work on the construction of aerial mining tramways, and later directed the construction of such tramways in South America and the United States. He had been consulting engineer for the state of New Jersey; for the Denver Water Board on the Moffat Tunnel bore; and on mining operations in the Cripple Creek District.

Charles Robert Foran Coutlee (M. '05) of Toronto, Canada, died in that city on January 1, 1944, at the age of 78. For many years in government service, Mr. Coutlee had been engaged on the Georgian Bay Canal and the upper Ottawa Storage Project, his specialty being canal works. He retired in 1931.

Fred Steere Darling (M. '03) of Hampton, N.H., died on January 11, 1944, at the age of 80. Mr. Darling spent his early career in railroad work, having been assistant engineer for the Northern Pacific from 1890 to 1902; division engineer on the construction of the Canadian Pacific Railway lines east of Winnipeg from 1902 to 1909; and engineer of maintenance of way for the Boston and Maine Railway from 1911 to 1913. Beginning in 1913, Mr. Darling was for some years in private practice.

Samuel Henry Feinson (M. '41) lieutenant colonel, Field Artillery, U.S. Army, was killed in the crash of an army airplane on January 17, 1944. He was 44. Colonel Feinson, who was attached to the third regiment, seventh battalion, at Fort Bragg, N.C., returned recently from overseas. He was on leave at the time of the accident. At the time of joining the army in 1942, Mr. Feinson had been for some years with the Bureau of Highways and Sewers, Office of the Borough President of Brooklyn. Earlier (1923 to 1925) he was with the Arundel Corporation in Brooklyn, and for several years was engaged in the practice of law.

Carl Davidson Forsbeck (Assoc. M. '24) city engineer of Tacoma, Wash., died suddenly at his home there on December 30, 1943. Mr. Forsbeck, who was 57, had been city engineer since 1932. Before that he was field engineer at Spokane and Tacoma for the Portland Cement Association. Earlier in his career he was engineer on maintenance-of-way projects for the Santa Fe and Southern Pacific railroads in the Southwest, and he had been city manager of Red Oak, Iowa. During the first World War he served with the 525th Engineers, going to France as a captain and returning later with the rank of major.

Lawrence Griffith (Assoc. M. '00) former engineer of Yonkers (N.Y.), died in Clearwater, Fla., on February 8, 1944. He was 75. Mr. Griffith had been connected with the Pennsylvania and New York Central railroads and was consulting engineer for the Westchester County (N.Y.) Transit Commission. For some years, also, he was city engineer of Yonkers. He went to Clearwater in 1940 after he had retired.

John Philip Hallihan (M. '06) Latin-American expert for the Foreign Economics Administration, Washington, D.C., died in that city on January 1, 1944, at the age of 76. Mr. Hallihan had spent much of his career in railroad work, having been engaged in construction and development work for various lines in this country, South America, Spain, and Mexico. From 1923 to 1935 he was executive engineer for the Detroit Rapid Transit System, and later was connected with the Washington staff of the WPA. During the first World War he served overseas with the Service of Supplies of the U.S. Army, having the rank of major.

Paul Hansen (M. '13) consulting engineer of Chicago, Ill., died on February 6, 1944, at the age of 64. An authority on sanitary engineering, Mr. Hansen was chief engineer for the Ohio State Department of Health from 1906 to 1910; state sanitary engineer of Kentucky from 1910 to 1911; chief engineer for the Illinois State Water Survey, 1911 to 1915; and chief engineer for the Illinois State Department of Health from 1915 to 1917 and from 1919 to 1920. From 1920 on he was a partner in the Chicago firm of Pearse, Greeley and Hansen (later Greeley and Hansen), engaged on the design and construction of water supply and sewerage works for numerous American cities. During the first World War he served overseas as staff officer with General Pershing on water supply.

John Wardwell Howard (Assoc. M. '13) for more than forty years a member of the civil engineering faculty at the Massachusetts Institute of Technology, died at his home in Dedham, Mass., on January 25, 1944. In 1903 Professor Howard joined the civil engineering staff of his alma mater, the Massachusetts Institute of Technology, as an assistant. Promoted through the various grades, he was associate professor of topographical engineering from 1922 until his death. In 1912 Professor Howard was sent to Costa Rica by President Taft to make a topographical survey for the establishment of the boundary between Panama and Costa Rica.

MARTIN JOACHIMSON (M. '14) mechanical engineer and patent attorney of Flushing, N.Y., died at Pass-A-Grille, Fla., on February 7, 1944, at the age of 76. Born and educated in Germany, Mr. Joachimson's entire professional career was spent in this country. From 1895 to 1896 he was a designer for the American Sugar Refining Company in Baltimore, and from 1897 to 1904 was with R. Hoe and Company, makers of printing presses. From the latter year until 1938 he was in the service of the City of New York—first in the Department of Bridges and, later, in the Department of Public Works. Coincidentally, Mr. Joachimson practiced law, retiring about a year ago.

NORRIS RAYMOND MACKLEM (Assoc. M. '12) engineer-manager for the U.S. Bridge and Culvert Company at Bay City, Mich., died at his home there on January 15, 1944. Mr. Macklem had spent practically his entire career with the U.S. Bridge and Culvert Company and its predecessor, the U.S. Bridge and Pipe Company. At one time he was treasurer of the organization.

CHARLES MAYNARD MAPES (Assoc. M. '07) principal industrial specialist of the Facilities Bureau of the War Production Board in Washington, D.C., died there on February 4, 1944. Mr. Mapes, who was 64, joined the WPB two years ago. For many years Mr. Mapes maintained a consulting practice in New York, and he had served the city as an engineering expert on street-development projects.

EGBERT JESSUP MOORE (M. '10) vice-president of the Turner Construction Company, of New York City, died at his home in Yonkers, N.Y., on February 1, 1944. His age was 66. Mr. Moore, who joined the Turner Construction Company forty years ago, served the organization as chief engineer before becoming vice-president. Although he retired from active work in 1931, he held the latter position until his death. Noted for his work in the development of reinforced concrete design in building construction, Mr. Moore was engaged on the design and construction of numerous notable metropolitan structures.

DAVID KIRK ORR (M. '11) retired roadmaster for the Monongahela Railway Company at Brownsville, Pa., died on November 9, 1943. Mr. Orr, who was 77, had been with the Monongahela Railroad from 1903 until his retirement in 1938. For a part of this period he was chief engineer. Earlier in his career he had been with the Pittsburgh and Lake Erie Railroad, and from 1893 to 1901 was shipping clerk for David B. Kirk and Company, Kansas City (Mo.) flour exporters.

CHARLES GEORGE SCHADE (M. '13) chief engineer for the Fort Pitt Bridge Works, of Pittsburgh, Pa., died on June 28, 1943, though the Society has just heard of his death. He was 73. Early in his career Mr. Schade was with the Keystone Bridge Company in Pittsburgh. From 1899 on he was with the Fort Pitt Bridge Works, serving successively as chief draftsman, principal assistant engineer, assistant chief engineer, and chief engineer.

ALFRED VARLEY SIMS (M. '96) owner and president of the Sims Pump Valve Company, of New York, died at Hamden, Conn., on January 21, 1944. Mr. Sims, who was 79, was the inventor of the Sims valve, which is used in many naval vessels. A Canadian by birth, Mr. Sims was educated in this country. His early affiliations included nine years as professor of civil engineering at the University of Iowa, and the post of general manager of the Cuban Eastern Railroad. In 1915 he founded the Sims Pump Valve Company to manufacture his valve for reciprocating pumps.

GEORGE WIER SMITH (Jun. '38) died in a hospital in New York City on January 7, 1944, at the age of 30. A graduate of Norwich University in 1938, Mr. Smith had been junior naval architect at the Mare Island (California) Navy Yard, and was also with the Pacific Gas and Electric Company in San Francisco. From October 1942 until illness forced his resignation he was with the California Shipbuilding Corporation at Terminal Island, California.

CHARLES HENRY STEVENS (M. '20) former Director and Vice-President of the Society, Philadelphia, Pa., died on February 3, 1944, at the age of 68. For more than 37 years Mr. Stevens' work centered on the improvement of transportation facilities in Philadelphia. During this period he was engaged on the planning, design, and construction of the city's new subway system. From 1930 to 1940 he was chief engineer of the Philadelphia Department of City Transit. In the latter year he retired to engage in private engineering practice. In 1941 he was called to Baltimore by the Army to serv as chief zone engineer of the Constructio Division of the Quartermaster Corp Long active in the affairs of the Society Mr. Stevens served as Director from 19 to 1932 and as Vice-President in 19 and 1942. He had also been secretary treasurer and president of the Philadelphi Section.

CHARLES H. STEVENS

CHARLES MASON TALBERT (M. '14 president of the Standard Underwriter Agency, Inc., St. Louis, Mo., died o January 25, 1944. Mr. Talbert, who wa 73, was a former president of the St Louis Safety Council and, for some years served as director of streets and sewer for St. Louis. He had, also, been vice president and president of the St. Loui firm of Deuchler and Talbert, Inc.

CLINTON GAMBRILL TUDOR (Assoc. M '07) for almost twenty years cadastra engineer and chief of the division of surveys of the General Land Office, Washington, D.C., died on November 3, 1943 His age was 70. Mr. Tudor had bee assistant engineer for the Lake Superio Power Company; assistant engineer fo the Cincinnati, Hamilton and Dayto Railway at Ironton, Ky.; and office engineer for the U.S. Engineer Department on a survey of the Illinois River. He had also been in the U.S. Surveyor General's Office.

THOMAS UTEGAARD (M. '42) lieutenant commander, Civil Engineering Corps, U.S. Naval Reserve, died in the U.S. Naval Hospital at Brooklyn, N.Y., on December 17, 1943. He was 50. From 1920 to 192 Mr. Utegaard was draftsman, structural designer, and chief of party for the Consolidated Water Power and Paper Company, at Wisconsin Rapids, Wis., and from 1926 to 1943 was assistant chief engineer. In January 1943 he was commissioned a lieutenant commander i the Civil Engineering Corps and, after his indocrination course, was appointed public works officer at the U.S. Naval Supply Depot at Bayonne, N.J. He became ill in April.

JOSEPH PALMER WADHAMS (M. '14) associate utilities engineer for the Public Utilities Commission of Connecticut at Hartford, Conn., died at New Haven, Conn., on January 17, 1944. He was 66. For many years connected with the Connecticut Public Utilities Commission, Mr. Wadhams was an expert on the valuation of water companies and municipal rates. He also directed the investigation of accidents in which public transportation companies figured. Earlier in his career he developed plans for the electrification of the New York division of the New Haven Railroad system.

(EDITOR'S NOTE: Through an oversight no mention was made of the fact that Edward Laramie Carpenter, Jr., whose obituary appeared in the December issue, met death at an Alaskan station while in line of duty as a lieutenant commander in the U.S. Naval Reserve. A reserve officer in the Civil Engineering Corps for ten years, Commander Carpenter was called to active duty in January 1943.)